AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Reg. U. S. Pat. Off

Published Weekly
Volume 72
Number 21

Contents

C. A. MUSSELMAN, Pres. and Gen. Mgr.; J. S. HILDRETH, Vice-Pres. and Director of Sales; W. I. RALPH, Vice-Pres.; G. C. BUZBY, Vice-Pres.

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AUTOMOTIVE INDUSTRIES

Vol. 72, No. 21 ▫ THIRTY-SEVENTH YEAR ▫ May 25, 1935

Estimate 386,000 April Sales

New Car Market Continues Strong; Deliveries Waver

by Harold E. Gronseth

Detroit News Editor, Automotive Industries

While lacking some of its earlier vigor, the retail market for motor cars continues strong with deliveries fluctuating slightly under the year's peak reached in April. The irregularity which has characterized recent weeks continues with sales off one week and up the next. Several companies reported higher figures for last week than for the preceding week, but new delivery records have become scarce. There is nothing in the picture now to indicate more than a seasonal easing of the sales pace over the next few weeks. Chevrolet's return to volume production will enable dealers to catch up on unfilled orders and help to sustain the industry's volume of deliveries even though other makes should begin to feel a seasonal slackening in demand.

The three weeks' strike of this major producer will leave an imprint both on the production and sales figures of the industry for May, making it virtually certain that neither volume will equal the April figures. Reliable estimates place domestic retail sales in April at 386,000 cars and trucks which compares with 261,932 units in April of last year, or better than a 47 per cent gain. Because of the Chevrolet car shortage caused by the strike and the inability of other makes to improve on their April showing, the industry's May deliveries are not expected to exceed 340,000 units. In May last year 259,056 cars and trucks were delivered. Both 1935 months, however, show the best sales volume since corresponding months of 1930.

In general, new car stocks are not considered high, being estimated currently at around 395,000 units, or between four and five weeks' supply on the basis of present rate of sales. The positions of different dealer organizations, however, differ widely. Some dealers undoubtedly are well stocked—others have barely kept abreast of sales all season and a few are still far short of their requirements. With warmer weather, open type models are coming into their own and factories are spurring production to meet demand for convertible body types. From now on more effort will be devoted to balancing stocks.

(*Turn to page* 692, *please*)

Second Demand Made for Ousting of Wolman, Byrd

The Officers Association of Automobile Industrial Employees has sent a second request to President Roosevelt for removal of Dr. Leo Wolman, chairman, and Richard L. Byrd, labor representative, from the Automobile Labor Board. Demand for their removal by the association became more insistent as the result of the Board's handling of the recall election at the Hudson plant. Employees had petitioned the ALB for an election to recall Arthur Greer, president of the Associated Automobile Workers, from the Hudson bargaining board, claiming they desired to be represented by someone employed in the plant. Greer doubts the genuineness of the petition and insists that the Board should investigate fully.

Ford Made Profit in 1934, Report Shows

Surplus Increased by $3,759,311, Bringing Total to $580,276,391

The Ford Motor Co. moved into the black in 1934 on the basis of the figures shown in its balance sheet filed this week with the Massachusetts State Commissioner of Corporations and Taxation. An increase of $3,759,311 in the company's surplus as of December 31 is reported. This brings the Ford surplus to a total of $580,276,391.

That the company would show a profit on 1934 operations was predicted in *Automotive Industries* in the June 9 issue of last year when it was reported that for 1933 the company has slashed its loss from $74,861,644 in 1932 to $3,923,524.

The balance sheet compares as follows:

Assets

Item	Dec. 31, '34	Dec. 31, '33
Real estate	$144,958,978	$150,912,504
Mach. and equip.	82,811,705	90,112,502
Inventories	63,634,223	48,537,414
Cash	361,667,154	343,304,237
Deferred charges	4,093,500	6,233,168
Total	$657,165,560	$639,105,825

Liabilities

Capital stock	$17,264,590	$17,264,500
Acc'ts payable	49,527,680	38,328,400
Reserve	10,006,988	6,995,838
Profit and loss	580,276,392	576,517,079
Total	$657,165,560	$639,105,825

White Union Workers Strike; Pay Rise, Guaranteed Seniority, Closed Shop Asked

Conferences between White Motor officials and members of the United Automobile Workers Federal Union opened Thursday, the third day of the strike in the Cleveland plant. About 2,000 employes left their machines Monday during a conference between officers of the union and Robert F. Black, new president of the company. In that meeting the union officers notified Mr. Black that a strike had been called and that no understandings, when reached, could avoid a shutdown. On the following day the union began picketing the plant. The company had ceased manufacturing operations in the meantime and moved the offices to a downtown bank building.

The strike was the outcome of more than a month of discussion. A union had formed in the White plant a year ago and had threatened a strike more than once. Wage increase was granted at one time. In recent demands the union asked for the closed shop, guaranteed seniority, a 15 to 20 per cent wage increase and time and one half for Saturday work. Negotiations were extended until Mr. Black should reach the plant from Cortland, N. Y., where he recently resigned the presidency of Brockway.

Meeting a union committee on his first day in Cleveland, Mr. Black managed to get the negotiations extended. He thought the discussion was proceeding satisfactorily and left to visit the branches. While he was away a strike was organized and was called as soon as he returned. The strike at White took place the Monday following the ending on Saturday of a strike at Bender Body

(*Turn to page* 692, *please*)

Battle to Save NIRA Shifts to House as Senate Stands Pat on Clark Plan

WASHINGTON, May 21—Something seems to have gone awry with the reputed sensitivity of our national legislators to the trends of public sentiment. As those who wear the senatorial toga get the word from back home, a nine months' extension of NIRA in emasculated form is what the folks want. While on the other side of the capitol, members of the House seem equally sure that the Administration's prescription for a two-year extension of the Recovery Act in a somewhat modified form, is what their constituents crave.

Why Congressional communication lines should bring such conflicting stories at this critical juncture in the life of the Blue Eagle, seems unexplainable, particularly when they recently have been reporting public sentiment with such clarity that important measures like the Wagner, Bonus and Motor Carrier regulatory bills, are passed by one or both bodies almost without debate.

However, the fact remains, with the expiration of the present Recovery law barely three weeks off, the Senate is standing pat on the Clark resolution extending the law for nine months, excluding intrastate commerce, and banning price fixing. At the other end of the capitol, House leaders insist that they will pass the Administration's seven point extension program which has been incorporated in a resolution. What the upshot of it all will be, no man can tell, but if both chambers persist in their present uncompromising attitude, because of the limited time before the expiration of the present act, the Blue Eagle will follow the dodo by default. Meanwhile uncertainty over what the rules are to be, mounts among business men.

Differing radically from the Administration bill which was dropped into the legislative hopper some time back, the resolution now being considered by the House is a lot more satisfactory to the automotive industry since the revisions it makes in the labor provisions do not appear particularly objectionable—at least they seem to give the President just about as much flexibility as he has under the present statute.

The President is authorized to approve and to prescribe codes. The controversial intrastate commerce issue is dealt with in a manner that will not suit Senators who want to get all intrastate commerce out from under codes. The resolution simply affirms what the Constitution says by stating that no code shall apply to a trade or industry not subject to the Federal power to regulate interstate commerce with the additional proviso that small enterprises which do not substantially affect interstate commerce may also be exempted. Obviously this does nothing to settle the argument over what Congress can and should regulate under the commerce clause of the Constitution. It merely leaves the door open, which the Senate seems determined to close, to continued application of the theory that things that "affect" interstate commerce are subject to Federal control.

Price fixing by concerted action would be prohibited except in the case of an emergency and in natural resource industries. But this prohibition does not mean that goods and services may not be sold without discrimination between customers at fair prices. This latter proviso is intended, for example, to give power to control destructive price cutting by which a big, well-heeled corporation might seek to drive its small competitors out of business.

All codes would be required to cover minimum wages, maximum hours, Section 7a and a ban on child labor. In setting wage and hour standards, the only limitation on the President is that they be fair and reasonable and in the interests of fair competition. Authority is granted to fix overtime rates.

Codes may contain definite prohibitions on dishonest or fraudulent trade practices and unfair methods of competition which have been so defined by the courts or the Federal Trade Commission. Any other trade practices included in codes will be

(*Turn to page* 694, *Please*)

Ford Minimum Wage Raised to $6 Daily

Company's Payroll Will Be Increased $2,000,000 Monthly by Higher Rate

The Ford Motor Co. has restored the $6-a-day minimum wage which is back to the Ford wage level of 1929. All employees receiving the present minimum of $5 a day will be raised to $6, an increase of 20 per cent, and many of the wage brackets above the minimum will be given hourly rate advances from five cents upwards. The average wage paid will be considerably above $6. Both Ford and Lincoln shops are included in the new minimum. A total of 126,000 employees will be affected, of whom 81,000 are in Detroit. Among Detroit employees more than 41,000 will receive a dollar a day increase. The new minimum will put an additional $2,000,000 a month on the company's payroll.

When the depression fell in 1929, Ford increased the minimum wage to $7 a day, which remained in effect until near the end of 1931, when the $6 a day minimum was resumed. A year later the minimum dropped to $4 a day. In March, 1934, it was increased to $5 a day. The present $6 minimum was the highest regular figure the Ford industries ever reached, until an extra dollar was added in an attempt to break the depression by increased purchasing power. This cost the company $33,000,000 in the 22 months it was in effect.

Electric Dynamometers For High Top Speeds

Increased maximum speeds running up as high as 6000 r.p.m. are now permissible with electric dynamometers of 100- and 200-h.p. ratings, as a result of recent developments made by the General Electric Company's engineers in the bearings, lubricating systems, and electrical design of d-c. machines. Previously, peak speeds of 5000 r.p.m. were considered the maximum for electric dynamometers of these capacities. The machines are available either with beam-and-dial scale equipment or with Toledo, Kron, or Howe Weightograph automatic scales.

Chevrolet Introduces New Fabric for Upholstering

"Tree-bark cord," an innovation in automobile upholstery fabric, has been made optional to purchasers of Chevrolet Master de luxe models. The fabric, new in pattern and color, is made of selected wool, and combines the good wearing qualities of Bedford cord and its ease of cleaning with a distinctively new appearance. It is a closely woven flat fabric.

Hudson Adds 124-in. Wheelbase Chassis to Special Six and Deluxe Eight Series

Touring brougham and suburban sedan models are now available in all series of the Hudson line, and 124-in. chassis have been added to the special six and deluxe eight series. Prices on the custom eight club sedan and brougham have been reduced from $1,070 to $1,025 on the former and from $1,145 to $1,095 on the latter. Prices on the 117 in. deluxe eight models have been raised $15 to $40, except on the convertible coupe which is $40 lower. A summary of the additions to the line follows:

	Six	Special 6 117 in.	Special 6 124 in.	Deluxe 8 117 in.	Deluxe 8 124 in.	Custom 8 124 in.
Touring brougham	$742.50	$812.50	$962.50	$907.50	$1,057.50	$1,127.50
Suburban sedan	802.50	872.50	912.50	967.50	1,007.50	1,057.50
Club sedan	....	....	880.00	....	975.00	....
Brougham	....	....	930.00	....	1,025.00	....

New Prices

Deluxe 8	New	Old	Custom 8	New	Old
Coach	$875	$835	Club sedan	$1,025	$1,070
Sedan	935	895	Brougham	1,095	1,145
Coupe, Z-4 p.	895	855			
Coupe	840	815			
Conv. Coupe	955	995			

Worker Contributions, Revised Old Age Pension Clause Urged in Security Bill

Recommendations for revisions of several sections of the omnibus Social Security Bill now pending before Congress, which would considerably alter the operation but not the intent of the measure, have been made to President Roosevelt by the Committee on Social Legislation of Secretary Roper's Business Advisory Council.

The committee's report deals principally with the unemployment insurance and old age pensions sections of the Bill. Reviewing the unemployment insurance provisions of the present measure, the committee makes five specific recommendations. They are:

First—the various sections of the bill be enacted as individual and separate bills.

Second—that fundamentally the bill be along lines of grants-in-aid to the states in the form of Congressional appropriations conditioned on the states' meeting federal standards.

Third—provision should be made for employee contributions rather than placing the entire burden upon employers.

Fourth—the plan should serve as an incentive to employers to provide steady work and prevent unemployment.

Fifth—the employer's contribution should be only on that portion of his payroll where the employee is subject to benefits if unemployed and not on the total payroll.

The present unemployment insurance provisions of the Bill impose a 1 per cent payroll tax beginning in 1936 and increasing to 3 per cent by 1938.

The committee's principal contention on its fourth recommendation is that the contributions go into a general pool and that employees in industries where unemployment is greatest will draw the most and employees in industries where employment is relatively stable will draw the least and therefore the latter industries will be paying more than their fair share of the total cost. The committee said: "We feel much more can be done along the line of stabilization of employment if an incentive is offered to employers, and it should at least be provided that the industries which have been able to reduce unemployment should pay less into the pool."

Respecting old age pensions the committee says in its report that inasmuch as the present Bill does not make the contributory plan operative until January, 1937, the "best course would seem to be to enact the old age assistance sections immediately, but delay action on old age benefits until 1936," and that this would give an opportunity in the meantime to study several plans which have been suggested and go into the whole matter more thoroughly, reporting to Congress by January 1, 1936.

Discussing benefits accruing to workers under the plan of the present measure the committee says "a penalty is put on greater skill and increased wage and long and faithful service" and points out that under the revised bill a worker receiving an average monthly wage of $100 will receive as a pension 42½ per cent of an average wage over a 30-year period, and that a worker receiving an average monthly wage of $200 over a similar period will receive but 30⅝ per cent. Touching upon the tax provisions, the report states that in the pending Bill initial rates are double the original proposals and increases occur in three year intervals instead of five. Section 801 of the omnibus bill provides for a 1 per cent levy on wages for a three-year period beginning in 1937 and increasing by one-half of 1 per cent in each succeeding three-year interval until a maximum of 3 per cent is reached in 1949. Section 804 imposes an excise tax upon employers in the same proportions and over the same intervals. When the full 6 per cent tax is imposed, the committee says, the benefits workers will receive will be less than could be obtained from insurance companies for the same expenditure.

Touching further upon benefits in the original plan and those in the present measure the committee points out that originally benefits were not to be paid workers over 65 still employed and benefits would not be increased by wages received after this age. The present Bill provides annuities for all over 65 regardless of whether the person remains in employment. It is pointed out that the original plan, which the committee believes the better, was designed to help those who have reached old age to retire thus making opportunities for the younger generation to secure employment.

The report was signed by Gerald Swope, chairman; Robert G. Elbert, Marion B. Folsom, Morris E. Leeds and Walter C. Teagle. Mr. Folsom did not sign the report on the unemployment insurance phase.

Seek to Block Wagner Bill in Lower House

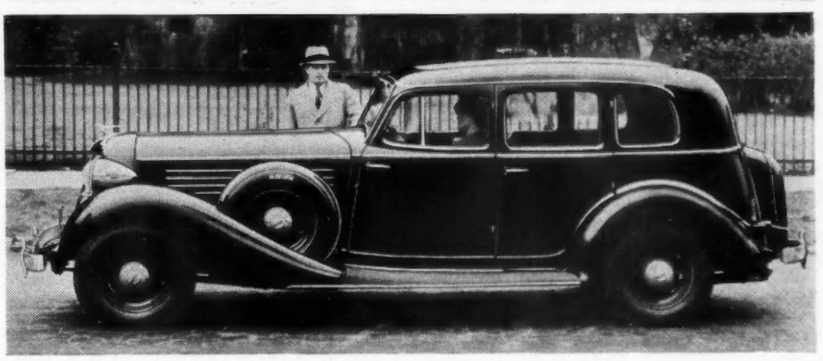
The Wagner Labor Relations bill, which business says will foment discord and which labor leaders maintain will prevent strife, went through the Senate last week with the greatest of ease. Under the pressure of the labor lobby and after only a few hours of discussion, the upper house voted passage of the measure 63 to 12 in the face of the vigorous and united opposition of business interests.

Efforts to block enactment of the bill are now being directed at the House where supporters of the companion Connery bill claim it would pass with equal ease if it came to a vote. The attitude of the White House on the measure is regarded in some quarters as the key to the situation, but so far the President has given no indication of his position.

In opposing the bill, business for the most part has emphasized its views of the unfavorable economic and social consequences of its enactment with less stress on its constitutionality. However, if it is enacted, there is no doubt that it will be attacked on constitutional grounds. The Supreme Court's coming decision in the Schechter poultry case in which the constitutionality of NRA regulation of wages and hours is an issue, should provide some indication of the probable fate of the Wagner measure, should it get to the nation's highest tribunal.

During the Senate proceedings in connection with the bill, Senator Tydings of Maryland, offered an amendment making coercion from any source an unfair labor practice. The amendment, which has been urged almost unanimously by business, was rejected.

The Wagner bill makes the National Labor Relations Board the "Supreme Court" of labor. Powers given it are extremely broad and greatly strengthen Section 7-a (collective bargaining) of the NIRA. By its principle of majority rule, it is argued that it would give to the A. F. of L., through further organization, complete control of industrial relations. Minorities would be denied any rights in collective bargaining. The government controlled board—which many think might seek to even control all labor itself—may summon employers to appear before it upon three days' notice. Findings by the board would bind any court to which appeal is made, yet the board would not be bound by "the rules of evidence prevailing in courts of law," so that a board decision, even if based on mere hearsay would be binding. The closed shop would be not only sanctioned but encouraged. The "company-dominated" union would be outlawed and if the board held an employee representation plan to be company dominated it would thereby be abolished, making ready way for organized labor.



Auburn's new seven passenger sedan, powered with a 115 hp. straight eight Lycoming engine with a wheelbase of 127 inches, announced this week

Fisher Body Strike Vote Fails; MESA Calls Walkout at Packard 120 Plant

An abortive strike at the Packard 120 plant sponsored by the MESA, failure of a strike vote conducted by the same union in four Fisher Body plants in Detroit, and the closing of the White Motor plant in Cleveland as a result of a walkout of members of the United Automobile Workers Federal Union, highlighted labor developments in the motor industry during the past week.

With no bigger issue than the reinstatement of a single workman the MESA called out its members in the Packard 120 plant resulting in the suspension of operations for a half day on Thursday last week. Operations were resumed again Friday, the company claiming only 100 men were out while the union claimed 400. The plant which manufactures the Packard lower priced car employs upwards of 2,500 workers and is turning out about 240 cars a day, five and one-half days a week. Efforts to extend the strike to other Packard divisions failed—the strikers apparently were unable to win the support of union members at work in the big car plant.

The strike ended Wednesday when those who walked out asked to be returned to work without discrimination, after failing in their objective to reinstate the union member who had been laid off. Demands for a 20 per cent wage increase for all Packard employes and establishment of a minimum hourly rate of 80 cents for men and 60 cents for women, made when it became apparent that a bigger issue was required to win support for the strike, also went by the boards.

The union member whose reinstatement was sought had been employed only six weeks and had been elected to the Packard bargaining board after he was laid off along with a number of new employes to make places for veteran Packard employes who had been transferred from the main plant where activity had been curtailed.

No announcement was made by the union of the strike vote taken among employes of the four Fisher Body plants in Detroit where demands had been made for a flat 15 per cent increase in wages and establishment of $1 an hour minimum, but it is understood that workers turned down the strike proposal by a good majority and it was decided to hold further action in abeyance until shop stewards could report greater union strength in these plants.

The MESA moves at both the Fisher and Packard plants obviously were ill-advised from the standpoint of union strategy and were interpreted in some quarters as having been prompted by the apparent success of the AFL in its General Motors controversy.

While terms of the Toledo settlement were pretty well compromised, impartial observers cannot escape the conclusion that the AFL made some headway, gaining a foothold in the industry which heretofore it has not had. If F. J. Dillon, Federation organizer for the motor industry, by his plea for acceptance of the compromise settlement, did not enhance his prestige with the management he at least rallied under the Federation's banner sufficient support to swing the election, thereby establishing the dominance of his union in the Chevrolet Toledo plant, after several times being on the verge of losing his grip. That Mr. Dillon regards the settlement as a victory for the union is evident. In his address to the strikers he said: "You have established in this agreement for the first time in the history of this industry the right for your committee to meet with the management and confer with them in reference to your grievances."

The Toledo strike developed into a made-to-order situation for Mr. Dillon, who assumed the role of peacemaker or buffer between the management and radical elements among the strikers, and gave him the opportunity of parading this boasted virtue of the union.

"I represent," Mr. Dillon told strikers, "a philosophy that is neither right nor left, a philosophy exemplified by the AFL for more than a half century."

No steps have been taken by either the management or the ALB to hold an election at the Hupp plant following the notice served upon the management and upon the U. S. Department of Labor by Mr. Dillon that union members at the Hupp plant would strike rather than submit to an election held by the labor board. Probabilities are, according to labor students, that no election will be held, indicating further the Federation's growing influence in the industry.

C. E. Wilson, right, vice-president of General Motors, congratulates Fred S. Kimmerling, general manager of the AC Spark Plug division, on the safety record of AC during April

Bohn Aluminum to Call $499,000 in Bonds Aug. 1

Bohn Aluminum and Brass Corp. on August 1 will call the remainder of its six per cent debentures of which $499,000 is outstanding of an original $2,155,700 issue to finance acquisition of the Michigan Smelting Co. The debentures would become due in 1938. The company declared a dividend of 75 cents payable July 1 to stock of record June 14. Similar payments were made in the four preceding quarters.

McCarl Holds Chevrolet Truck Contract Illegal

A War Department contract covering the purchase of 3,950 Chevrolet trucks for the CCC for about $2,800,000 has been ruled illegal by Comptroller General McCarl on the ground that the specifications appeared to be drawn to favor the Chevrolet product. Since deliveries have already started there is considerable speculation on how payment will be made. Mr. McCarl also hit specifications he regarded as restrictive in two other cases—one for 600 trucks for the National Guard and the other for 520 ambulances for the CCC.

In the Chevrolet contract, the specification Mr. McCarl attacked was the requirement that the engines have a minimum piston displacement of 205 cu. in. He said that Chevrolet was the low bidder among four, but Fargo did not bid apparently because the specification ruled out the Dodge KH30 with 201.3 cu. in. displacement.

Excerpts from Mr. McCarl's comments follow:

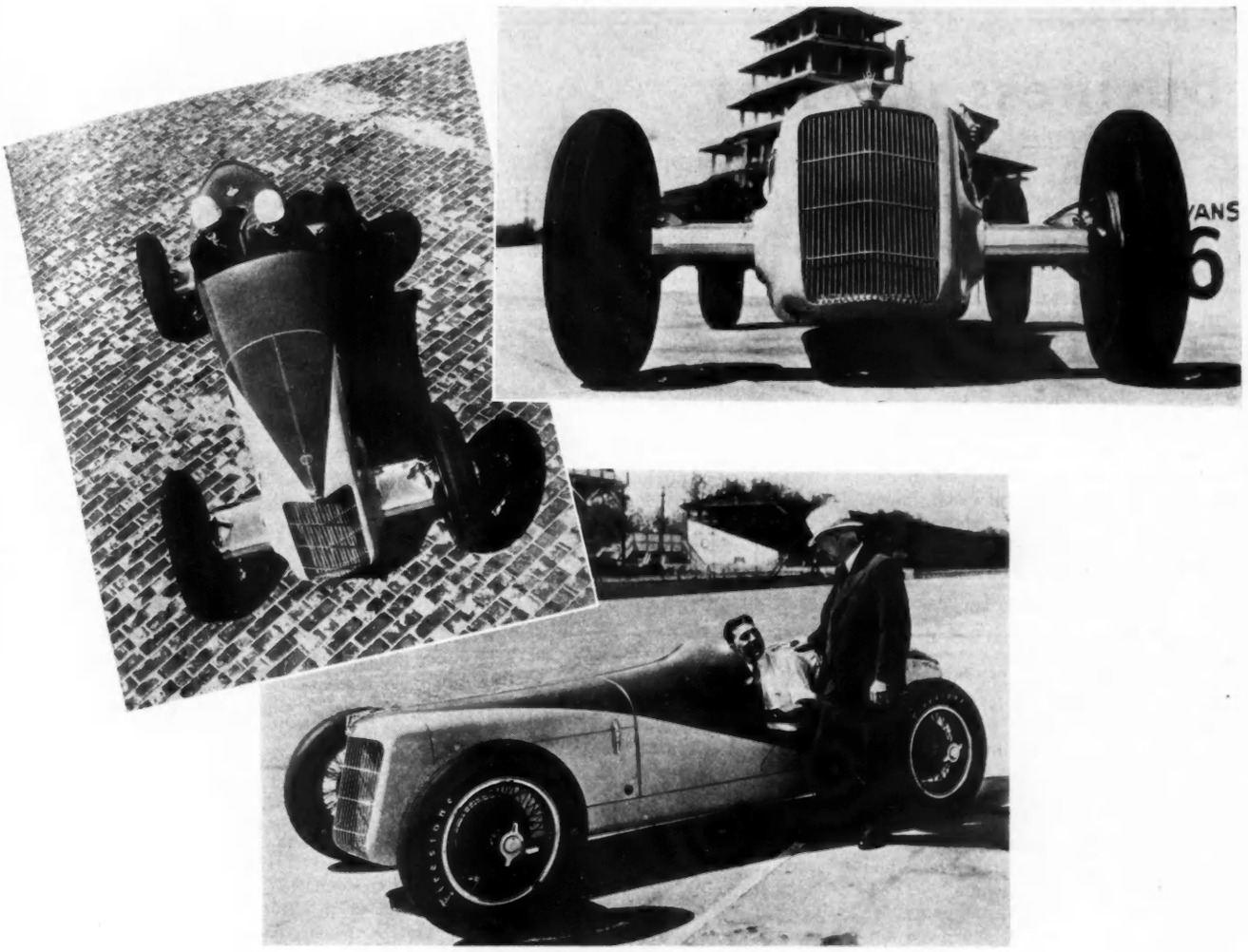
"The specifications stated that the requirement of a minimum piston displacement of 205 cubic inches was based on 'reports' covering service use under required operating conditions. However, there is and has been no showing to this office as to where, when, by whom or to whom such reports were made and on what facts such reports were based. Nothing less than general facts based upon a comprehensive survey and study of the comparative performance of the various makes of trucks in use would justify the conclusion that an engine with a less cubic inch displacement would not be satisfactory.

"In the present instance the specifications appeared to have been drawn without reference to the actual requirements of the service, sufficiently narrow to exclude the Dodge KH-30, with 201.3 cubic-inch displacement; sufficiently broad to admit the Chevrolet, with a piston displacement of 207 cubic inches, and sufficiently low to prevent manufacturers and dealers in other makes of automobiles from competing on an equal or nearly equal basis.

"In other words, the specifications appeared to have been drawn for the purpose of purchasing Chevrolet trucks without any competition as contemplated and required by the law."

MEWA Issues New Credit Reference Directory

The Credit Reference Directory issued by the Motor and Equipment Manufacturers Association Credit Department has been stepped up to four editions a year instead of the two per year formerly issued. The second edition for 1935 has already been mailed to all participants in the activities of the MEMA Credit Department.



Three of the team of 10 Ford V-8 Specials designed by Harry Miller, race car builder, get their first tests on the Indianapolis Speedway. The upper picture shows Cliff Bergere behind the wheel of the car he will drive in the Memorial Day classic. The lower picture shows Harry Miller, the designer, talking with George Barringer who will drive one of the 10 cars in the race.

AMA to Direct New York Show; Dealers in Chicago

Management of the New York Automobile Show to be held November 2 to 9, will revert to the Automobile Manufacturers Association. The Chicago show will be managed by the dealers as it was last year.

Ford has been invited to participate but is not expected to accept the invitation. However, this company is expected to stage a separate exhibition during show week in one of the larger hotels or other suitable display place. It is anticipated at this time that Lincolns will be featured at some hotel.

Air Corps, Navy, Army Needs Put at $15,000,000

Submitting his annual report at thirty-third Spring Convention of the National Machine Tool Builders, H. H. Lind, general manager, estimated that the Army Air Corps, Navy and Army establishments require an approximate $15,000,000 equipment program which may be available out of new Federal relief funds.

C. J. Stillwell, president, noted the prevalence of obsolete equipment, emphasized his industry's objective development of cost reduction methods and better quality as justification for investment at the present time. Col. Frank Knox, president Chicago Daily News, the luncheon speaker, said the depression has run its full course and that recovery is retarded by lack of stimulation. Durable goods recovery, it was pointed out, hinges on a balanced budget and currency stabilization.

Stranahan Eliminated From British Golf Play

Robert A. Stranahan, president of the Champion Spark Plug Co., who has been competing in the golf tournament in Great Britain, has been eliminated from play. Mr. Stranahan is a golf enthusiast and during the spring and summer months travels around to many tournaments. He keeps in daily touch with his office in Toledo by long distance and transcontinental telephone. His brother, Frank, also a Champion official, is a tennis and polo player.

House Gets Wagner Bill; Seek President's Backing

The House Committee on Labor, headed by Representative Connery, unanimously reported out the Wagner Labor Disputes Bill Tuesday of this week. However, before the measure is permitted to come before the House leaders will discuss the Bill with President Roosevelt.

Chairman Connery conferred with the President on Monday and after leaving the White House said he felt sure Mr. Roosevelt favors enactment. Supporters of the Bill in Washington are rather free in their predictions that the Chief Executive will sign the measure, but should it receive a Presidential veto, they claim there is sufficient support in both branches of Congress for an override. The claim is based upon the 60 to 13 vote the Bill received in the Senate.

Present plans, it is understood, call for the Bill being called up sometime during the coming week and in the interim Speaker Byrns and Mr. Connery are reported to be planning a session with the President to insure his support.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

General business continued to improve last week; wholesale trade was larger, and industrial operations were at about the same level as in the preceding week. Retail business throughout the country averaged from about 5 to 10 per cent above that a year ago, but there is some disappointment because retail demand does not expand at a faster pace

Car Loadings Rise

Railway freight loadings during the week ended May 11 totaled 575,185 cars, which marks an increase of 6,120 cars above those during the preceding week, a decline of 27,613 cars below those a year ago, and an increase of 40,379 cars above those two years ago.

April Food Prices Lowest

Retail food prices during the two weeks ended April 23 increased 0.8 per cent. This increase brought the food index up to the level of March 15, 1931. Food prices are now 17 per cent below the lowest April average during the years 1925-30, inclusive.

Dept. Store Sales Down

The increase in department store sales during April was considerably less than the estimated seasonal amount. The Federal Reserve Board's adjusted index for that month stood at 74, based on the 1923-25 average as 100, as against 82 for March and 75 for February.

Chain Store Sales Gain

Sales of 25 store chains during April were 17.02 per cent above those in the corresponding period last year. However, Easter last year fell in March. Aggregate sales of these store chains in March and April of this year were 10.4 per cent above those in the corresponding months last year.

Current Output Increased

Production of electricity by the electric light and power industry in the United States during the week ended May 11 was 3.5 per cent above that in the corresponding period last year.

Farm Exports Off

According to the Bureau of Agricultural Economics, farm exports during March were only 45 per cent of the prewar average, as compared with 75 per cent a year ago, and 67 per cent two years ago. Exports of cotton were the smallest for any month in the last 10 years.

Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended May 18 stood at 82.3, as against 82.2 the week before and 82.1 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended May 15 showed practically no changes in holdings of discounted bills, bills bought in the open market, and government securities. There was a decline of $2,000,000 in money in circulation and an increase of $9,000,000 in monetary gold stocks.

Springfield Co. Designs Coach Line for Bentley

Springfield Manufacturing Corp., formerly Rolls-Royce of America, Inc., has designed a line of coaches for the Bentley sport car, produced by Rolls-Royce, Ltd., at Derby, Eng., and recently on sale in this country through Brewster & Co., Inc. Thus far complete cars have been imported from England, but if present prospects are maintained the bodies will be built here for the American trade. Improved sales of the regular Rolls-Royce cars in this country are reported.

Broken GMT Office Safe Foils Louisville Burglars

A gang of safe-crackers broke into the General Motors Truck Company offices in Louisville, Ky., last week, for the second time in less than two months, but left without taking anything when they discovered that the safe, which they looted of $100 during their first visit, had not been repaired, was open and contained nothing of value. S. S. Jenkins, manager, said a new safe was purchased two days ago, but had not been delivered.

Graham Wins So. African Reliability Test Run

A Graham Six has been awarded the Vacuum and Schlesinger trophies for its performance in a strenuous reliability test run between Johannesburg and Capetown, South Africa, according to cable dispatches received at the Detroit headquarters of Graham-Paige.

The test was over a course of more than 2000 miles of the worst terrain on the African continent and included steep, narrow mountain passes, sandy wastes, the Karoo plain and some of the world's roughest roads with widely varying temperatures, according to the report. It is said the car averaged 23 miles to the gallon of gasoline in 1150 miles of strenuous driving. The report to the factory stated the Graham was the only car out of 25 of American and European manufacture to finish the run without losing a single point.

Pontiac Promotes Murray, Klein, Sibley, Zone Mgrs.

A. W. L. Gilpin, vice president and general sales manager of Pontiac Motor Co. has announced several changes in regional and zone office personnel:

Verne L. Murray, manager of the central region with offices in Detroit, becomes manager of the Atlantic region with headquarters in New York City. Mr. Murray has been associated with General Motors for several years, holding many intermediate field positions from sales representative to regional manager. He came with Pontiac Motor Co. Nov. 1, 1933, as manager of the central region.

To replace Mr. Murray, A. A. Klein is promoted from the Cleveland zone managership, where he has been located since 1933. Mr. Klein's experience with General Motors prior to 1933 covers several years of field organization work with another division of the Corporation.

Fred C. Sibley, who goes to Cleveland as zone manager, has had some zone manager experience for Pontiac in Boston dating back to 1926. More recently he has been connected with the New York regional and zone offices.

APEM Code Authority Officially Recognized

Formal recognition of the code authority for the Automotive Parts and Equipment Manufacturers code has been announced by the NRA. Members of the code authority are: C. S. Davis, Borg-Warner Corp.; C. E. Wilson, General Motors Corp.; Vincent Bendix, Bendix Aviation Corp.; M. C. Dewitt, Champion Spark Plug Co.; B. F. Hopkins, Cleveland Graphite Bronze Co.; Lothair Tetor, Perfect Circle Co.; Hugh H. C. Weed, Carter Carburetor Co., and the following members to represent various divisions of the industry: C. C. Carlton, Motor Wheel Corp., the original equipment division; W. G. Hancock, McCord Radiator & Mfg. Co., the replacement parts division; H. L. Horning, Waukesha Motor Co., the internal combustion engines division; and J. Y. Scott, Van Norman Machine Tool Co., the shop equipment division.

Gordon Godley

Funeral services for Gordon Godley, 35 years old, who was killed in a motor accident last week, were held Monday in Port Huron. Mr. Godley, who is survived by his wife, a son and his parents, was assistant sales manager for the Mueller Brass Co.

Bernhardt F. Mueller, vice-president and treasurer of the company, who was injured in the same accident will recover, physicians believe.

Steel Output Expands Under Motor Pressure

Finishing Mills Near Capacity on Reinstated Orders From Industry

Automotive takings of steel showed an impressive increase this week, with the trend continuing upwards. Reinstatement of shipping orders, on which parts makers had asked postponement because of the dislocation caused by labor troubles, prompted finishing mills to expand their production schedules, in some instances to virtually capacity, every available bit of mechanical and manpower being employed in the mills in the Detroit district.

Producers of cold-finished steel bars, who have been complaining for a long time about the inadequacy of the $3 per ton conversion margin that they net in the present set-up, came in for heavy tonnage releases. Sharply contrasting with the pressure on the capacity of finishing mills, catering to automotive needs, was the easing off in the rate of ingot output, employed primary capacity receding this week from 43.4 to 42.8 per cent. Strip mills shared with sheet mills in gains. Alloy steel specialists also stepped up their operating rates.

Early this week there was no indication that any major changes would be attempted in third-quarter price filing. With prices unaltered, a continuance of prevailing buying methods is looked for until probably half of the third quarter has run its course. Then, if the general business situation gives any indication of supporting a mark-up in values, protective covering of fourth quarter needs may become a factor. Aside from any general uptrend in commodity prices, steel producers rely for eventual upward revision on the need of unloading part of the higher emergency rail freight costs on the consumer, even though they absorb this added cost item in the next quarter. Much is being made of the possible effect of the fate of NRA on prices, but it is very doubtful if any business of importance is being withheld from the market in the expectation of price declines in the event of a change in the code set-up. A $4 per ton reduction in the price of electrical furnace tubing S. A. E. 4615 became effective this week for all points of origin.

Pig Iron—Notwithstanding an increase of 50 cents per ton in Ohio intrastate rail freight rates effective June 1, third quarter prices are definitely slated on an unchanged basis in the Cleveland market. Automotive foundries are taking in more iron this week.

Aluminum—Steady and unchanged.

Copper—An unconfirmable rumor that Anaconda and Natanga interests had agreed upon further steps to raise the world price of copper was current in the market early this week. The spread between the "outside" market price for electrolytic and the "Blue Eagle" quotation has narrowed to a point where it has become unattractive even to those few who might not be bound by "Blue Eagle" agreements.

Tin—Spot Straits tin was offered at the week's beginning at 51.35 cents, down ⅛ cent from the preceding week's close. The Sterling exchange market rules about 6 cents per pound higher than it did a month ago, and this is the major tin market influence at present.

Lead—Following several, successive advances, lead was quoted by one of the prominent producers on Monday at 4 cents, New York. Producers are said to be reluctant to sell more than their current intake at that level. Storage battery manufacturers are prominent among the buying consumers.

Zinc—Steady and unchanged.

MIT Offering New 5-Year Coop Engineering Course

A new five-year cooperative course in mechanical engineering, leading to the degree of master of science, will open next month at the Massachusetts Institute of Technology, according to Prof. Jerome C. Hunsaker, head of the mechanical engineering department.

The new course, which is designed to give students an insight into the technical and executive aspects of industrial manufacture, will be given in cooperation with the General Electric Company. Under the cooperative plan, which is similar to that successfully operated for several years past by the department of electrical engineering, students will carry on practical work in the company's plants in conjunction with their studies at the Institute.

Industrial Adv. Meeting Program Spans '29-'35 Gap

The convention program of the National Industrial Advertising Association to be held in Pittsburgh, Pa., Sept. 18 to 20, is planned to bridge the gap between 1929 and 1935 which marked the era of depleted appropriations and changing organizations, according to the committee in charge of the meeting. The program has been developed by leaders in industrial advertising who have an intimate knowledge of problems paralleling those of the average industrial firm.

Sports Commission Adopts Racing Class for Diesels

Paris, May 8 (By mail)—A racing class for Diesel engines was adopted today by the International Sporting Commission, meeting in Paris, on the suggestion of the Contest Board of the American Automobile Association. This rule goes into effect immediately and allows world's speed records to be established for the first time with the injection type of engine.

The official definition of a Diesel engine is one in which all the fuel is injected into the combustion chamber, none of it being passed with the air through the intake manifold, and in which the charge is fired by the heat of the compression. An electric hot point can be used for starting up only. The compression ratio is left free.

The international racing formula to be applied in 1937 and the two following years is a maximum weight of 1653 pounds with water, oil and gasoline for a distance of 180 miles. Tires are not included in this weight. Compressors are allowed and there are no restrictions on piston displacement or type of fuel.

The present rule, which will continue in force until the end of 1936, fixes a maximum weight of 1653 pounds empty without tires. The American delegate combatted this rule on the ground that it was developing an unhealthy type of car, but was outvoted by European interests.

Contestants in long distance speed records over big tracks such as are laid out on the saltbeds of Utah are now allowed as many supply stations as desired (under official control). A ruling has been taken against cutting across the infield, and also against coming back to the pits the wrong way of the track. At least two European teams will attempt to break world's long distance records on the Utah saltbeds this Summer.

Michael W. McArdle

Michael W. McArdle, for 30 years with Chicago Flexible Shaft Co., the last seven as president, died May 15 in his apartment at the Drake Hotel, after an illness of several months.

The AC Spark Plug products exhibit at the recent industrial exposition in Geneva, Switzerland. The exhibit was built in three sections about a huge replica of a spark plug as the central piece. On one wing was a robot built of AC products.

Sales Finance Cos. Directory Published

NASFC Issues Accredited List of Organizations; Govt. Regulation Hit

A "Directory of Accredited Sales Finance Companies" has just been published by the National Association of Sales Finance Companies. In addition to listing the members alphabetically, the directory also includes a geographical index of all of their offices. In a preface, the make-up and functions of the association are described, the activities of sales finance companies explained, and the place of instalment selling discussed. In addition, standard time-sale terms are listed as are approved trade practices.

In a letter accompanying the directory, John R. Walker, executive vice-president of the association, attacks vigorously the present tendency toward governmental regulation of finance companies. Charging that most legislative proposals are predicated on an extremely superficial knowledge of the business, Mr. Walker declares that "If, 20 years ago, we had suffered from the present mania for governmental regulation of private business, and the states had arrogated to themselves the prerogative of determining the credit terms upon which merchandise could be sold, instalment selling would have been outlawed and this highly important facility of modern business would not have been permitted to evolve, because the arm-chair economists, doctrinaires and self-appointed public guardians of the age were agreed that instalment selling was destructive of thrift and economy.

"Proposals for state regulation of instalment financing invariably overlook the essential fact that such financing is a mere adjunct or complement of instalment selling and a part of the merchant's mark-up; hence its flexibility should not be destroyed by statutory regulation, nor should it be compelled to present itself to the buyer in a form which is objectionable psychologically, such as for instance the setting forth of the Time Sale Differential as a percentage of the cash price.

"The abuses in the field of instalment financing are negligible in relation to the volume of business . . . and . . . are constantly becoming less as a result of competitive forces within the industry and because of the focusing of public attention on them. The cost to the public of such abuses is inconsiderable in comparison with the cost which the public would be compelled to pay if the industry were saddled with the cost of state regulation, plus the heavier cost of the devitalizing effect which such regulation would have."

Canadian Dealers Organize

A Dominion charter has been granted "The Dominion Automobile Dealers Association," Ottawa, Ont., described as a national organization to "organize, develop, promote, protest, improve and assist" the retail automotive trade. W. H. McIntyre of Ottawa, Ont., was named president and J. R. Dixon of Ottawa managing director and secretary.

Vern R. Drum
New Hupp President

Estimate 386,000 April Sales

(*Continued from page 685*)

April Registrations

New passenger car registration returns from 31 states during April amounted to 151,088 as against 104,140 for the same states a year ago, a gain of approximately 45 per cent. On the basis of these returns, our estimate of last week will have to be revised slightly downward to a total for the month of 324,000 as against 222,900 during April, 1934.

Registrations of new trucks in 26 states, for this same period amounted to 21,048 as against 16,485 during April, 1934, an increase of approximately 27 per cent. If this same ratio is maintained throughout the remainder of the states, total truck registrations for April should amount to about 49,500 units.

Pontiac

Pontiac production continues on the basis of 19,000 cars for the month which compares with an actual output of 18,749 cars. During the first 11 working days 10,367 cars were turned out, or an average of 942 a day, with three days running over 1,000. By May 15 the company had turned out 80,925 of the 1935 cars, well in excess of the 1934 model production of 76,533 units. The company reports that retail deliveries are being maintained at the same high rate, the first four months showing more than twice as many deliveries as the corresponding period in any of the previous three years.

Plymouth

Swinging up again, Plymouth weekly retail deliveries passed the 10,000 mark for the second time this year during the week ended May 18 when the total was 10,003, an increase of 10.6 per cent over the preceding week and 36.7 per cent over the corresponding week of last year. It brought Plymouth's deliveries for the first 20 weeks this year to 156,353 units comparing with 111,629 in the like period of 1934. H. G. Moock, sales manager, said: "New car sales still are leading other businesses in gains made this year. The American public spent $750,000,000 for new automobiles during the first four months this year, against $500,000,000 in similar period last year."

Dodge

Dodge dealers during week ended May 18 delivered 7,498 Dodge and Plymouth passenger cars and 1,199 trucks, a total of 8,697 vehicles comparing with 7,226 cars and 1,190 trucks or a total of 8,416 units in the preceding week. Combined passenger car and truck deliveries by Dodge dealers to May 18 this year were 139,893 as against 87,646 vehicles for the corresponding 20 weeks of 1934.

Studebaker

Studebaker reports marked improvement in truck sales, the company's dealers taking 56 per cent more trucks in the first four months of this year than in the similar period of last year, while April truck sales to dealers were up 61 per cent.

Oldsmobile

With deliveries of approximately 5,600 cars in the first 10 days of May Oldsmobile set another new high in retail sales showing a gain of 89 per cent over the corresponding period of last year. A similar gain is shown in production which continues at the rate of better than 19,000 cars for the month, or practically the same as in April.

Chrysler

Chrysler dealers delivered 3,948 Plymouths and 1,128 Chryslers during the week ended May 18, a total of 5,076 units comparing with 3,641 Plymouths and 1,152 Chryslers, or a total of 4,793 units in the preceding week, an increase of 5.9 per cent. The first 20 weeks of this year show deliveries of 16,657 Chryslers and 60,279 Plymouths by Chrysler dealers, comparing with 7,805 Chryslers and 42,865 Plymouths in the similar 1934 period. During the week ended May 18 dealers also delivered 6,978 used cars.

Cadillac-LaSalle

Retail Sales of Cadillac and LaSalle cars in first 10 days of May were up 10 per cent over the corresponding period of April and 23 per cent over the first 10 days of May, 1934.

White Union Workers Strike

(*Continued from page 685*)

which had delayed by two weeks the delivery of a number of White buses.

Despite these irritations the affair was conducted with a courtesy somewhat exaggerated on both sides. In a full-page newspaper advertisement, Mr. Black said "there could be no stronger proof of the morale of White workers and of their kindly feeling toward the company than the peaceful way in which they laid down their tools and walked in orderly fashion from the factory."

In the same advertisement Mr. Black reminded readers that White was the one survivor of 34 automobiles which had been manufactured in Cleveland in four decades. White had moved the Indiana Truck to Cleveland, he said, in face of the general belief in the industry that Cleveland was "a grave yard for automotive concerns."

There is said to be some possibility that the Indiana Truck will be moved to Marion, Ind., but for reasons not connected with the strike. The purpose of the advertisement is said to have been mainly the company's desire to see that relations with its employes remain peaceful not only during but after the strike.

During the discussions Mr. Black had declined the closed shop, had replied that the company already was paying wages on a parity with other truck companies, and that it was following the seniority rules of the Automobile Labor Board.

Trading Ratio Down, Cash and Clean Deals Up in 1934, NASFC Survey Shows

The ratio of used to new car unit sales and the percentages of new car clean and cash deals, all decreased in 1934, according to the annual analysis of the National Association of Sales Finance Companies which was made public this week.

The number of used cars sold per 100 new cars declined from 178 in 1933 to 171 in 1934, a favorable development from the dealer's standpoint inasmuch as his used car expenses and losses are a function of used car volume. The reduction in the ratio of used car volume was the result not only of an increase in the percentage of new car clean deals from 14.2 per cent in 1933 to 22.3 per cent in 1934, but also because 52.2 per cent of used cars were sold without trades last year against 48.5 per cent in the previous year.

The percentage of new cars sold on instalments decreased from 56.8 per cent in 1933 to 54.6 per cent. In view of the better business conditions prevailing last year, this decrease is somewhat surprising since it might be expected that the improved outlook would have given more people the courage to make commitments against future income. In the 1929-1931 period this percentage averaged above 62 per cent. If it is assumed that the difference between this figure and the actual 1934 percentage is a measure of the instalment sales that would have been made, had prospective buyers had normal confidence in the continuity of their incomes, a substantial number of sales were lost because of this apparent feeling of insecurity.

The analysis reflects the general loosening up on credits which intensified competition has brought. The percentage of paper extending for more than 12 months increased from 12.9 per cent in 1933 to 24.3 per cent in 1934, while paper with sub-standard down payments accounted for 14.2 per cent of the total last year against 11.6 per cent in the previous year. Despite these easier credit terms, the percentage of repossessions on both new and used cars declined from 2.8 to 2.3 per cent on the former and from 7.8 to 6.8 on the latter, while the loss per repossession went up from $42 to $50.

A comparative summary of the NASFC analysis is presented in the accompanying table.

Judge W. F. Connolly

Judge William F. Connolly, treasurer and director of Briggs Manufacturing Co., died Thursday in Providence Hospital following an operation. A chronic heart ailment was aggravated by a recent attack of Influenza.

New Type Flexible Tubing Announced by Imperial Co.

A new type of flexible tubing for fuel, oil and air lines has been announced by the Imperial Brass Manufacturing Company of Chicago. This flexible tubing is intended to take the place of copper tubing which is said to be unable to stand up on modern automotive powerplants because of their flexible mountings and vibration due to high speeds.

This new tubing, while very flexible, is claimed to be gas-, oil- and air-tight. It is made with a brass inner core composed of interlocking members, which is fused to a compound covering, with a braided fabric on the outside. This fabric is treated to resist oil. The tubing is claimed to be resistant to heat, cold and vibration, and to be unable to swell or "kink" shut. It is said to be specially adapted for oil lines. A cutting block has been designed for cutting the tubing to the required lengths, and flexible couplings to fit the tubing are available.

Used Car Allowance May Be Revised, Richberg Hints

Revision of the uniform trade-in allowance provision of the dealer code to allow for greater flexibility was indicated by Donald R. Richberg, NRA chief, during his testimony before the House Ways and Means Committee to urge enactment of the administration's bill to continue NRA for another two years beyond June 1.

Under questioning by Representative Bachrach of New Jersey, Mr. Richberg said that the set-up allowances on used cars are not sufficiently flexible and cited his personal experience to prove his view that greater flexibility should be written into the proviso. Mr. Richberg stated he sold his car himself because he could get more for it in this way than by using it as a trade-in on a new car purchase.

The NRA head said that it was because of a practice of excessive trade-in allowances in pre-code days that the existing uniform provision was written into the dealers' code. The old procedure, he pointed out to the committee, was based considerably on the used car market, the dealer making an allowance below the figure at which he believed he could resell the traded-in car. Mr. Richberg also told the Committee that the sale of a used car is an intrastate transaction, but that the handling of automobiles from the manufacturer into the hands of the customer is practically a continuous interstate transaction. From these remarks observers drew the inference that Mr. Richberg considers the retailing of automobiles is interstate commerce and therefore a matter of continued codification.

NASFC Annual Survey

NEW AND USED CAR FINANCING AND TRADING RATIOS

	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934
ALL MOTOR VEHICLES										
1 Ave. note all new cars	$550	$595	$574	$635	$595	$567	$554	$546	$516	$551
2 Ave. note used cars..	280	277	286	307	296	279	268	241	220	227
6 Loss per repos. car...	55	69	45	59	63	65	47	59	42	50
PASSENGER CARS	%	%	%	%	%	%	%	%	%	%
9 Per Cent Repossessions, new	2.1	2.4	2.9	2.9	3.0	3.7	4.5	5.7	2.8	2.3
12 Per Cent Repossessions, used	3.6	4.7	5.3	5.6	5.6	6.9	11.4	13.1	7.8	6.8
13 SKIPS PER 1,000 DEALS	..	..	..	4.7	5.2	5.1	5.5	5.5	4.6	2.1
PAPER RATIOS	%	%	%	%	%	%	%	%	%	%
16 Paper over 12 months.	18.3	13.2	12.4	14.5	14.9	16.6	17.8	21.9	12.9	24.3
19 Sub-stand. down pmt.	19.4	9.0	5.2	6.1	8.0	11.8	11.1	13.7	11.6	14.2
20 New cars, per cent of total	53.1	48.6	57.6	54.9	54.0	46.2	42.1	36.5	41.6	36.4
21 New car paper, per cent	69.0	67.0	73.2	71.6	70.0	63.4	60.1	56.6	62.5	59.2
RECOURSE ON USED CARS	%	%	%	%	%	%	%	%	%	%
22 Cos. all recourse.....	50.0	46.0	36.8	37.6	38.0	38.3	29.8	29.1	26.6	33.3
23 Cos. part recourse.....	44.0	40.0	55.6	54.8	56.2	52.4	54.4	60.8	65.6	52.8
24 Cos. all or part rec....	94.0	86.0	92.4	92.4	94.1	90.7	84.2	89.9	92.2	86.1
PER CENT SOLD ON INSTALMENTS	%	%	%	%	%	%	%	%	%	%
25 New cars	68.2	64.5	58.0	58.1	62.6	62.3	62.8	54.6	56.8	54.6
26 Used cars	62.8	65.2	63.1	60.8	65.1	64.8	60.4	47.0	56.8	58.1
27 Total cars	65.5	64.8	60.8	59.5	64.0	63.8	61.3	48.6	56.8	56.8
PER CENT TRADE-INS	%	%	%	%	%	%	%	%	%	%
28 On new car sales.....	..	..	72.0	69.4	72.5	75.1	80.2	88.7	85.8	77.7
29 On used car sales.....	..	..	37.1	39.4	45.5	49.1	46.7	47.7	51.5	47.8
30 All, per cent new cars sold	99.0	90.0	116.0	115.5	127.1	155.5	160.0	175.6	177.5	159.6
31 Used cars sold % new.	..	..	118.5	117.0	128.6	164.0	170.6	185.9	178.0	171.2
32 Junked, per cent of trade-ins	..	..	6.9	8.1	9.2	14.3	13.5	14.3	12.9	7.1

NOTE: In above table, items 1-2-6 relate to all motor vehicles; other items to passenger cars only.

COMMERCIAL VEHICLES

	1932	1933	1934
PER CENT SOLD ON INSTALMENTS	%	%	%
25 New cars	57.0	51.5	52.6
26 Used cars	58.5	56.9	55.7
27 Total cars	57.8	54.3	54.0
PER CENT TRADE-INS	%	%	%
28 On sales of new cars	70.4	63.2	55.8
29 On sales of used cars	36.5	46.3	40.5
30 Total	109.6	111.9	91.3
31 Used cars sold, per cent of new cars sold	107.4	105.3	87.6
32 Used cars junked, per cent of trade-ins	14.8	16.7	10.4

Battle to Save NRA Shifts to House

(*Continued from page* 686)

enforceable only by the FTC, which is given specific enforcement authority through the mechanism of "cease and desist" orders.

Any violation of the wage, hour and child labor provisions and of fair trade practices which have been defined by the courts or the FTC as dishonest, fraudulent, unfair, etc., is a misdemeanor with a maximum fine of $500 for each day such violation continues.

Under the proposal, governmental authority could only be wielded by public officers or agencies of the Federal Government. A period of six months is allowed for the revision of existing codes to bring them into line with the terms of the resolution.

The break between the Administration and the Senate over extension of the National Industrial Recovery Act became sharply defined at hearings begun yesterday before the House Committee on Ways and Means. Simultaneously volumes of protests came to members of Congress from industries throughout the country as they organized support of the Administration measure and in opposition to the Clark resolution. Going further, the General Committee of Industry and Business Committee for NRA Extension was preparing to demonstrate opposition to the Clark resolution at a meeting of business interests called for tomorrow by Ward Cheney, silk manufacturer, chairman of the committee.

Leading both the attack on the Clark resolution and the drive for the Administration bill at the hearings was Donald Richberg, NRA chairman. Mr. Richberg, while stating he was in sympathy with the purpose of the Clark resolution to continue NRA with definite restrictions as to intrastate commerce and price fixing, declared, however, that he was also convinced that the provisions of the resolution are unworkable and inadequate to accomplish its declared intention. He said that the effect of an extension of only 9½ months, even without amendments, would be demoralizing because it is necessary anyhow to revise many of the codes and their administration and to limit the activities and improve the efficiency of NRA in the light of experience and to meet just criticisms.

An extension of two years was declared to be absolutely necessary. Among reasons given for his position, Mr. Richberg said it was necessary to prevent the entire breakdown of labor and fair trade-practice provisions by chiselers who are already at work undermining the standards of fair competition.

"The extension of the NRA for a few months, with the added burden of necessary code revision made impossibly difficult by vague and sweeping amendments, will simply bring rapid deterioration and disintegration of the whole recovery program," said Mr. Richberg.

NRA, he said, is entirely in accord with the evident desire on the part of Congress to forbid any monopolistic price fixing and to confine the exercise of Federal authority strictly within the constitutional power of the Federal Government to regulate interstate commerce. He said, however, that the provisions that "no price fixing shall be permitted or sanctioned under the provisions of any code" furnishes only a vague and confusing standard for administrative action. Literally, he pointed out, it forbids anyone operating under a code to fix the prices of the goods he sells. The phrase "price fixing" by itself, it was stated, does not mean either "price fixing by private agreement," or "price fixing by governmental action," but covers the fixing of a price by anyone, including producer or seller of an article.

Explaining that under the anti-trust laws there are provisions against price discrimination, Mr. Richberg inquired as to whether it would be illegal "price fixing" to provide in a code that when a price is fixed by anyone it shall be maintained without discrimination.

"One of the chief methods of monopoly, one of the major 'monopolistic practices,' which codes of fair competition are designed to prevent, is the practice of destructive price cutting and price discrimination," said Mr. Richberg. "In this way a big corporation with large financial resources may destroy its small competitors in a price war by taking away business and driving them into bankruptcy. Is it illegal 'price fixing' in a code to prohibit such a monopolistic practice?"

Mr. Richberg told the committee that if it is the purpose of the amendment to prevent producers or distributors from fixing prices by agreement so as to maintain an artificial price level, that intention should be clearly stated. He also assailed as a vague and unworkable standard for administration, the provision that "no code of fair competition shall be applicable to any person whose business is wholly intrastate." He pointed out that the codes apply to trades and industries as a whole and regulate the conduct of those engaged in them. The codes, said Mr. Richberg, should not apply to trades and industries that are wholly intrastate in their operations or effects. It was stated that a "loose and vague phrase of this character opens the door to universal evasion of code requirements and would subject all bona fide interstate operations to the unfair competition of any person who could claim that his business was 'wholly intrastate.'"

Air Bureau to Test Plane Propeller of Solid Steel

A solid steel airplane propeller of a new type which holds promise of increased efficiency and lowered manufacturing costs will be built for the Bureau of Air Commerce, Department of Commerce, as a project in the bureau's airplane development program.

Under a contract with Ernest G. McCauley, of Dayton, Ohio, five of the propellers are to be delivered on or before Sept. 30. They are intended for use in airplanes of a new design which are being constructed for the bureau.

According to John H. Geisse, chief of the bureau's Development Section, the new propellers will be thinner than types now used, and the cross section will be of a different shape.

"Tests already made indicate that these propellers will be slightly more efficient than other propellers," Mr. Geisse said. "Also, we believe that the new shape will bring about an improvement in cooling of the engine. The blades and hubs are to be machined from die forgings, and once the necessary shop machinery has been set up, costs should be less."

Ford V-8 Production in England Begins July 1

Production of Ford V-8 cars by the Ford Co. of England will begin about July 1, according to an announcement by Sir Percival Perry, chairman of the company, at the recent annual meeting of shareholders. Heretofore the Canadian and United States companies of the Ford organization have supplied these cars for the British market and continental associates of the English company.

According to Sir Percival's statement even the lowered British horsepower tax makes it vain for the company to hope for an adequate British market for the V-8 car, but the company begins manufacture in the hope of "recovering the business of supplying the requirements of our European associated companies."

NIRB Forbids Use of Code Funds for Assn. Purposes

The National Industrial Recovery Board in a letter to all code authorities has outlined the various purposes for which code authority funds may and may not be used. A sharp differentiation is drawn in the letter between code administration and trade association activities and the NIRB advises that expenditures for the latter will not be approved unless specifically authorized in the code.

Sullivan Joins Lebanon

W. B. Sullivan, pioneer in the development and manufacture of heat and corrosion Resistant Alloy Castings, and organizer of the Michiana Products Corporation, has joined the alloy department of the Lebanon Steel Foundry, at Lebanon, Pa.

CALENDAR OF COMING EVENTS

SHOWS

Machine Tool Show—Cleveland..Sept. 11-21
New York Automobile Show, New York, Nov. 2-9
Detroit Automobile Show.....Nov. 9-16
Buffalo Automobile Show .....Nov. 9-16
Cincinnati Automobile Show.....Nov. 10-16
Automotive Service Industries Show—Atlantic City .....Dec. 9-13

CONVENTIONS AND MEETINGS

Automotive Trade Assoc. Managers Mid-Year Meeting, Washington, D. C. .....May 22-24
Automotive Engine Rebuilders Assoc. —Indianapolis ....May 27-30
S.A.E. Summer Meeting—White Sulphur Springs, Va. .....June 16-20
American Society for Testing Metals, Detroit .....June 24-28
National Industrial Advertising Association, Pittsburgh.....Sept. 18-20
American Transit Assoc., Bus Division, Atlantic City .....Sept. 23
National Assoc. Sales Finance Cos.—White Sulphur Springs.....Sept. 26-28
American Society for Metals, Annual Meeting—Chicago .....Sept. 30-Oct. 4
National Safety Council, Louisville, Ky. .....October 14-18
American Gas Association — Atlantic City .....Oct. 14-18
American Petroleum Institute — Los Angeles .....Nov. 11-14
National Industrial Traffic League—Chicago .....Nov. 20-21

RACES

Race—Indianapolis Race, Indianapolis, May 30

JUST AMONG OURSELVES

Renewed Interest in Rotary Valves

FROM the time when Charles Y. Knight made his ten strike with a sleeve-valve engine until about a decade later, we heard a great deal about other types of non-poppet-valve engine, including those with rotary and piston valves. But when few of these engines reached the production stage, interest in the subject began to wane, and during the past decade announcements of new designs of rotary-valve and similar engines have been rare. However, development work on such engines has never ceased entirely, and recently there seems to have been a recrudescence of interest in the subject. According to information received, at least three designs are being actively pushed at present, and some announcements may be looked for in the not distant future.

Knight's original object was to produce an engine which would be quieter than the poppet-valve engine of the early nineteen-hundreds, which, especially in its cruder forms, was related to the threshing engine. That, of course, cannot be the object today, because the modern poppet-valve engine, when skillfully designed and produced, meets rather well the demand for quietness of operation, at least as long as it is in a good state of repair. Hence other advantages must be shown if engine builders are to be induced to discard the long-established poppet type.

Among other advantages that will probably be claimed for the rotary valve engine are greater speed and output possibilities, by reason of the positive valve motion, and lesser manufacturing costs, due to a reduction in the number of parts in the valve gear. Then, in a radial aircraft engine a rotary type of valve might have the advantage of reducing the over-all diameter, which is of importance in connection with the drag caused by the engine. All radial aircraft engines are of the valve-in-head type, and it is not difficult to conceive of rotary valve constructions which would considerably reduce the height of the structure beyond the outer end of the cylinder bore.

* * *

Who Should Control Shop Discipline?

MANY automobile workers, regardless of union affiliation or non-affiliation, seem to feel that employees should have some authority or responsibility in connection with certain phases of shop discipline. The closed shop advocates, of course, would give the unions major functions in controlling the operations of hiring, firing, application of seniority rules, etc. They see the foreman as a minor despot whose personnel functions should be eliminated and who should be reduced to a purely technological functioning.

Experienced employers naturally hold an opposite view. "The function of management can belong only to management and to nobody else" expresses concisely the attitude of most men faced with the responsibility of operating effectively and profitably a plant entrusted to them by stockholders.

Those who would attempt to interpret as well as read the news of the employer-labor relationships in the automobile industry these days may often find their thinking clarified by recognition of the existence of these two viewpoints on the practical question of shop discipline.

* * *

New and Used Car Stocks

WHILE inventories of new cars in dealers' hands appear to be in a statistically sound position, used car stocks cannot be viewed with entire equanimity according to reports coming to us from various parts of the country. In fact, among dealers the opinion seems to be rather general that the liquidation of inventories of second-hand cars this year is going to be attended with unusually heavy losses. Moreover, there is a limit to the number of used car dealers can carry even with the help many are getting from finance companies this year. And as this limit is approached, new car production is bound to reflect the situation.

Fortunately better weather in recent weeks has brought some improvement in used car volume, but on the whole our information indicates that used cars have not been moving out of dealer stocks at nearly the rate they have been coming in as the result of the high rate of new car sales.

So far as new car stocks are concerned, judging from the best data we are able to get, they totaled about 350,000 on May 1 —not much over a 30-day supply. On April 1, dealers had about 335,000 units in stocks while on May 1 last year they were carrying about 313,000 new passenger cars.

The Editors

Engine with Cored-In Manifolds and Bodies Feature New

by Joseph Geschelin

Detroit Technical Editor, Automotive Industries

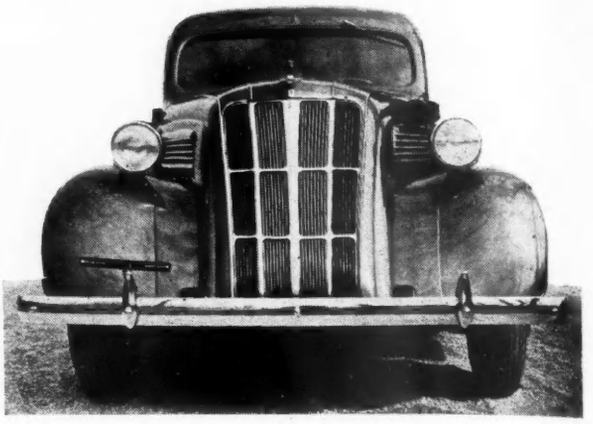
A FORETASTE of impending early car announcements for the 1936 season is found in the new "400" series Nash, some of whose features were covered briefly in last week's issue.

Listing at from $675 to $790 this is truly a new car featuring six body models of all-steel construction with steel roof and underbody—and an entirely new L-head six-cylinder seven-bearing engine, with 3⅜-in. bore x 4⅜-in. stroke, developing 90 hp. at 3400 r.p.m. Compression ratio is 5.58 to one. Chassis units such as axles, transmission, and ventilated Borg & Beck clutch are the same as on the Advanced Six series but the frame is new. Hydraulic brakes and clutch pedal starting are continued as on the previous models.

The line is mounted on a chassis having a wheelbase of 117 in. with 58-in. tread in front and 60¼ in. in the rear. Curb weight of the four-door sedan is 3100 lb.

Pistons are of aluminum alloy with Invar struts, split skirt, and four rings. Electrical equipment features an air-cooled AutoLite generator mounted at the engine leg, belt driven, with the water pump mounted off the inside end of the shaft. Battery is U.S.L. of 120 amp. hr. capacity to take care of radio installation.

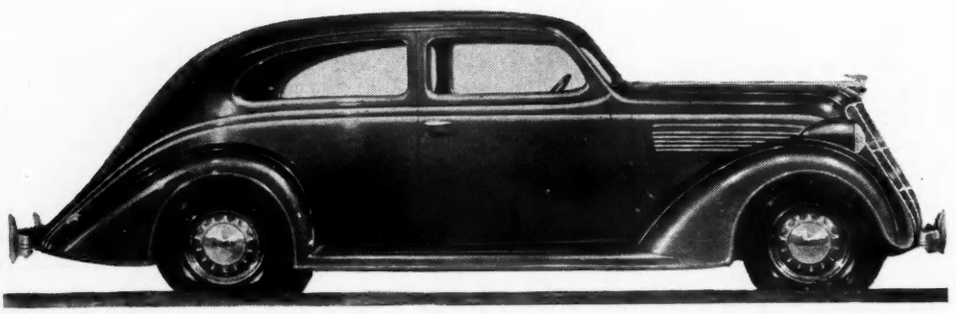
Sealed pressure cooling system operating at about 7 lb. per sq. in. pressure is used. Pressure is controlled by a two-way valve built in as part of the radiator filler cap.



The grille, hood sides and top form a single assembly, hinged at the cowl and which swings up and back to give access to the engine compartment

An unusual feature of the upper structure is independent mounting of the front fender assembly and radiator freeing this unit of the vibration effects that may be transmitted through the frame. In this construction, a system of "A" bracing with the point of the "A" at the dash serves to hold the fenders at the front end. The fenders are attached to the tips of the running boards at the rear and to the extremities of the frame ends at the front. The radiator is mounted between the front fenders on brackets attached to the fenders, free of the frame. A horizontal bar running behind the radiator connects the inner edges of the fenders, making a triangular bracing in conjunction with the "A" brace.

These cars have fine riding quality as evidenced by our own experience as a passenger while driving over very bumpy roads. This is credited to synchronized springing and balanced chassis weight. Weight, loaded, is equally distributed between front and rear. The springs have "Silenite" damper



Ample space for luggage is provided in the rear slope of the Nash "400" Victoria. On this model as on all other bodies in the line, the spare tire is carried inside at the rear

Nash "400" Specifications

Engine

Type	L-head
No. of cylinders	6
Bore	3⅜ in.
Stroke	4⅜ in.
Piston displacement	234 cu. in.
Brake horsepower	90 at 3400 r.p.m.
A.M.A. horsepower	27.34
Compression ratio	5.58 to 1
Firing order	1-5-3-6-2-4

Crankshaft

Crankshaft weight	63 lbs.
Main bearing journal diam.	2 31/64 in.
Main bearing journal (lengths):	
No. 1—front	1¼ in.
No. 2	15/16 in.
No. 3	15/16 in.
No. 4	1⅞ in.
No. 5	15/16 in.
No. 6	15/16 in.
No. 7	1⅜ in.
Total bearing surface	66.34 sq. in.
Vibration dampener	Rubber friction type.

Camshaft

Bearing diameter and length:	
No. 1	1⅞x1 25/64 in.
No. 2	2 13/64x11/16
No. 3	2 11/64x11/16
No. 4	2 9/64x11/16
No. 5	2 7/64x11/16
No. 6	1¾x1½
Camshaft drive	Silent Whitney timing chain.
Chain width	9/16 in.
Chain pitch	⅜ in.
No. of links	60

Connecting Rods

Connecting rod length (center to center)	8¾ in.
Lower bearing diam.	2 in.
Lower bearing length.	1 19/64 in.
Upper bearing length.	1⅛ in.
Lower bearing material	Babbitt lined steel backed.
Upper bearing material	Rolled bronze diamond bored.
Connecting rods rifle bored	Yes

Shock Absorbers

Make	Gabriel
Type	Double acting hydraulic with thermostatic and automatic control.

Steering

Steering gear type	Gemmer worm and roller type.
Steering gear ratio	16.4 to 1
Steering wheel diameter.	17 in.
Mounting	Roller bearing
Turning circle	34 ft.

Tires

Size	16x6.00
Pressure	30 lbs.

Transmission

Type	Synchro shift
Gear ratio in high	1 to 1
Gear ratio in intermediate	1.604 to 1
low	2.819 to 1
reverse	3.38 to 1
Transmission oil capacity	3 lbs.

Valves

Material, intake	High chrome nickel steel.
Material, exhaust	Chrome nickel silicon steel.
Clear diameter—intake	1½ in.
Clear diameter—exhaust	1⅝ in.
Seat angle—intake	45 deg.
Seat angle—exhaust	45 deg.
Head diameter—intake	1 21/32 in.
Head diameter—exhaust	1 17/32 in.

Brakes

Type	Bendix hyd.
Brake drum diameter	10 in.
Brake lining width	2 in.
Braking area	176 sq. in.

Axle—Rear

Type	Spiral bevel drive semi-floating.
Housing	Malleable center with tubular ends.
Axle-shaft material.	High carbon molybdenum steel.
Oil capacity	3 lbs.
Gear ratio	4.1 to 1
Read clearance	7 7/16 in.

Clutch

Type	Single plate dry disc Borg & Beck.
Clutch facing diameter, outside.	9¼ in.
Area each facing	42.35 sq. in.

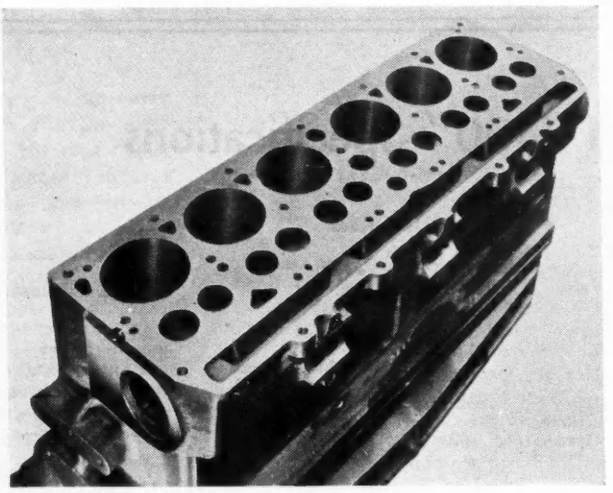
ls and Steel Top
w Nash Six-Cylinder 400 Series

leaves at the spring leaf tips which control spring action under all conditions. The spring rate is about the same front and rear—125 lb. per in. front and 120 rear. Springs are rubber covered and require no lubrication at any time.

The hood, hood sides, and radiator grille come as an integral unit hinged at the cowl and lifting upward from the front. The unit is fastened in place by means of two wing nuts under the grille level. One of the novel features at this point is the "service door" which is a hinged cover on the front of the hood lifting by the radiator ornament. When the door is lifted it exposes two filler spouts—the outer for water, the inner for crankcase oil.

Here is a car that can be serviced at the gas station without lifting the hood. A very tricky gadget tells the car operator whether he has sufficient oil in the crankcase. The instrument board gas gage normally reads the contents of the gas tank but the crankcase situation can be checked on the same gage simply by depressing a button which shifts the needle control from the gas tank float to the crankcase float.

The "Monitor Sealed Motor" reveals features not found on any production engine today. No exposed manifolding—the intake cored in the water-cooled head, the exhaust in the side of the block, while the oil manifold is cored in the lower end of the crankcase, eliminating oil plumbing in the crankcase. It is claimed that accessibility is excellent for minor servicing such as valve grinding and tappet adjustment. For examples, the valves are exposed simply by removing the cylinder head with carburetor attached, while the tappets are easier to get at because of the absence of manifolding on the valve cover side. The engine

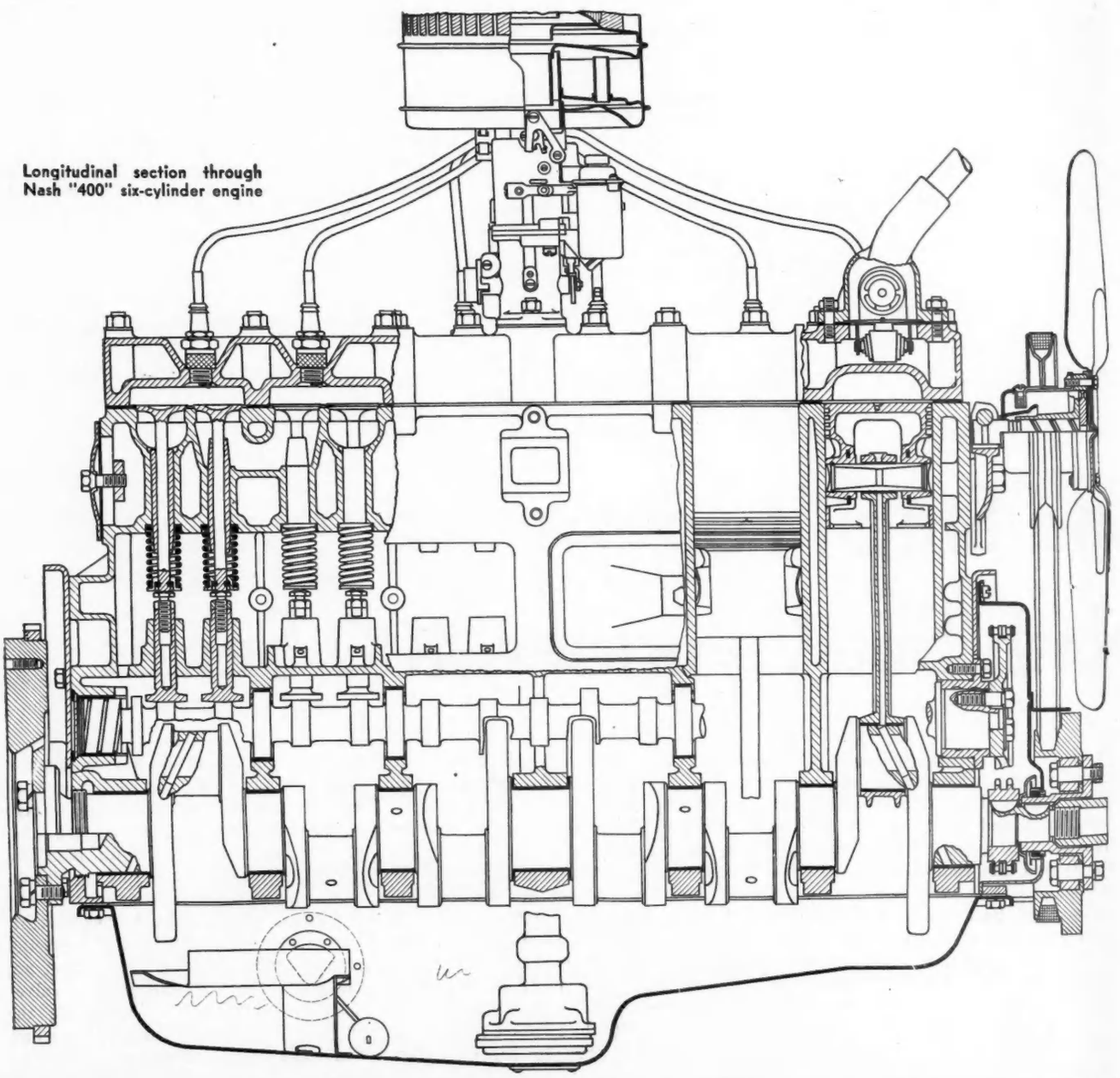


The exhaust manifold is integral with the cylinder block. The exhaust pipe which bolts snugly against the three ports which are surface broached to a glass-like finish which makes the use of gaskets at these points unnecessary

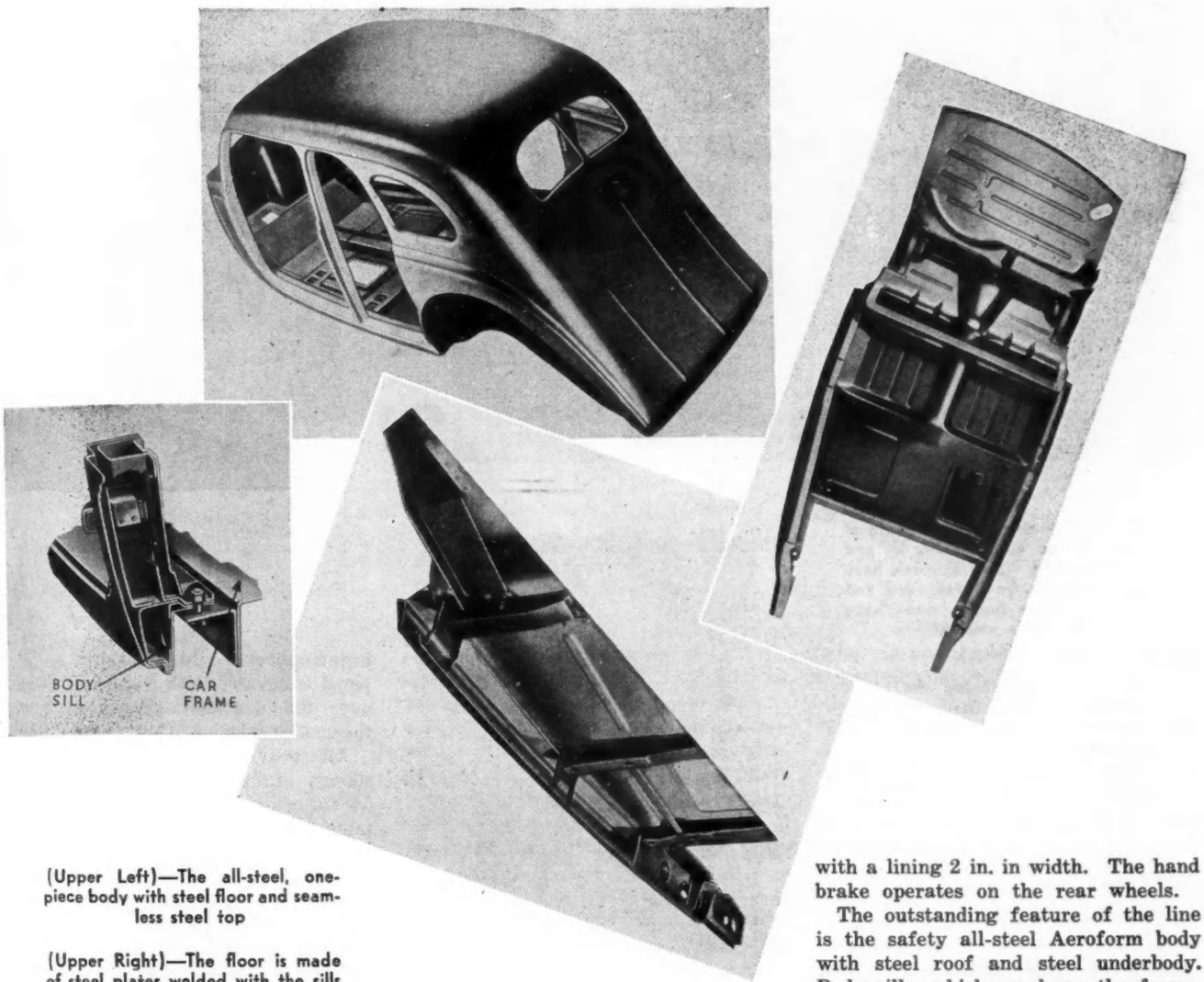
is mounted on four rubber cushions with a stabilizer.

The carburetor, of down-draft type by Stromberg, is mounted on the top of the cylinder head. A passage in the head allows incoming mixture to pass directly from the carburetor throat to the intake manifold. Water jackets are provided on three sides of the intake manifold. This method of controlling manifold heat, which Nash calls "Iso-thermal Fuel Control," is said to maintain the temperature of incoming fuel at a constant level.

Because exhaust heat has no functional duties in the operation of the "400" motor, it passes directly from three slotted ports into the exhaust pipe bolted snugly against the side of the



Longitudinal section through Nash "400" six-cylinder engine



(Upper Left)—The all-steel, one-piece body with steel floor and seamless steel top

(Upper Right)—The floor is made of steel plates welded with the sills and cross braces to form a unit

(Lower Left)—Body sills overhang the frame adding to interior roominess without increasing roof height. Seven large bolts on each side anchor the body to the frame

(Lower Right)—A view of the all-steel floor from the underside shows the body sills and cross members of box-type construction

block. A surface-broached, glass-like finish on the ports eliminates the need of exhaust gaskets and insures a tight fit.

Instead of the conventional full-length rectangular plate, held in position by a series of bolts, water jackets on the "400" are sealed by two circular bell plates held in position by clamps on their inner side. These clamps are drawn tight by a single bolt through the center of the plate. The Nash system of metered pressure cooling is continued and uniform engine temperature, with less than 5 deg. variation between the extreme ends of the block, is claimed.

Possibility of leakage has been reduced to a minimum in the packingless water pump which has a bakelite ring around the pump driveshaft seated against the inner surface of the pump cover plate. This ring is locked in position by a pin through the pump shaft and held tightly against the cover plate by a Duprene synthetic rubber sleeve which is under constant tension and is impervious to alcohol, oil or other substances that might be present in the cooling system.

The seven main bearings as well as the connecting-rod bearing are of the steel-backed babbitt, interchangeable type.

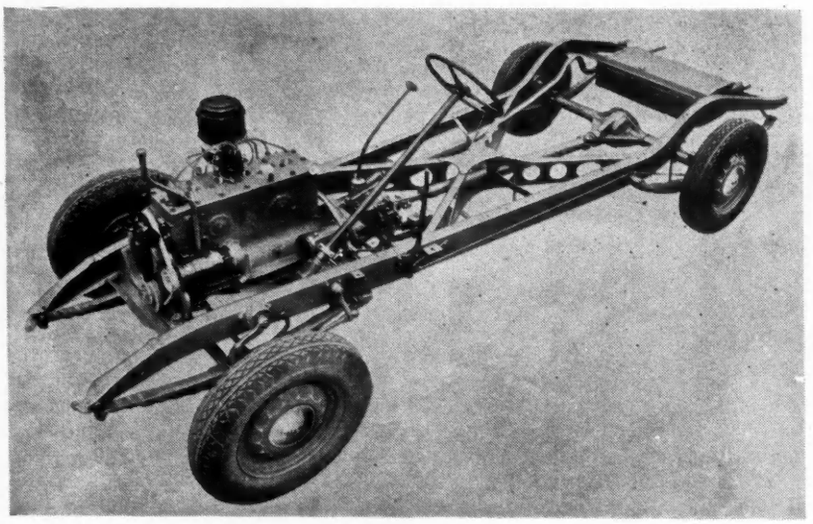
Two characteristics mark the new frame—its side channels are straighter with less kick-up at the front end and the two members forming the X-bracing cross each other in a straight line. With a depth of 6 in. and flange width of 2¼ in. the frame forms a rigid foundation for the "400" chassis.

Super-hydraulic brakes of the Duo-Servo type are standard equipment. Their total braking area is 176 sq. in., with a lining 2 in. in width. The hand brake operates on the rear wheels.

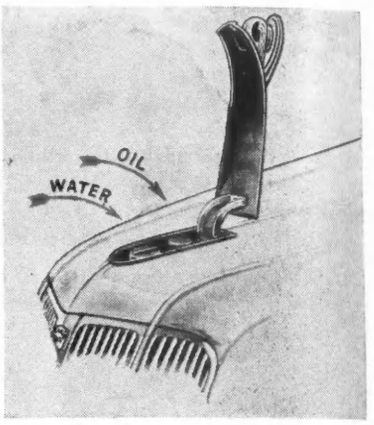
The outstanding feature of the line is the safety all-steel Aeroform body with steel roof and steel underbody. Body sills, which overhang the frame, are of light box-section, increasing strength and rigidity without adding much weight. The body is secured to the frame on seven brackets with a large single bolt in each bracket.

The methods employed in the construction of the body are rather unique and involve the use of new resistance welding machines which were installed at the Seaman body plant for the purpose. Perhaps the outstanding feature of body production is that the weld lines and welding tools have been worked out so precisely that no metal finishing and no solder repair are necessary.

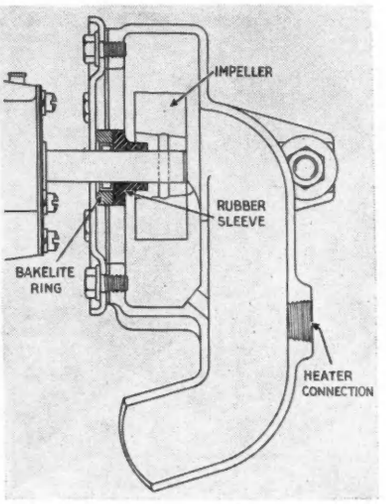
In detail, the top of the cowl, windshield pillars and forward portion of the roof as far back as the center door pillar, are formed in one stamping. Each rear side quarter of the body and side roof crown panel, as far forward as the center door pillar, is also in one piece. The rear half of the top and the entire back panel of the body make up another huge stamping. In assembling, the cowl sides are welded to the stamping made up of cowl top, windshield pillars and forward portion of the roof, while the rear quarter



Frame of channels have a depth of 6 in., flange width of 2¼ in. and 7/64 in. thick. Side channels have less kick-up in front than usual and the X-member braces cross each other in a straight line



The hood service door—oil and water may be added to the engine without raising the hood. The oil depth gauge is located on the dash



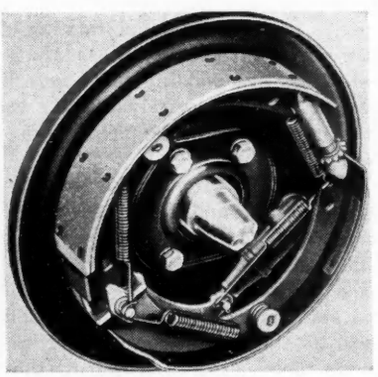
A bakelite ring around the pump driveshaft is seated against the inner surface of the forward cover plate and held tightly in position by a sleeve of synthetic rubber. This method of construction makes repacking of the pump unnecessary. The Duprene sleeve is impervious to alcohol, oil or other substances that might be present in the cooling system

panels are welded to the center panel forming the rear of the roof and back panel of the body. These two halves are then placed upside down in a huge flash-welding machine which welds them together across the roof from side to side. This top part of the body is then welded to the assembly consisting of the steel floor with its heavy box-type sills, the center door pillar is welded in place, and the body shell, which is welded into one piece, is ready for insulation, hanging of doors and trimming.

This body provides an excellent example of acoustic insulation. The inside of the roof panel, body sides and door panels, and the underbody, all are sprayed with a plastic sound deadening compound. In addition, the roof panel is covered with a sheet of Seapak over the deadener for acoustic and thermal insulation.

All body types are exceptionally roomy. In the sedan front seats are 54 in. wide at shoulder height, rear seats 53 in. Arm rests are provided for both front and rear-seat passengers. The instrument panel, in addition to the regulation equipment, contains a large package compartment and, on the left, space for radio installation. Upholstery is cloth with Mohair velvet optional on special order.

Every model has concealed spare tire and luggage space provided in the rear of the body. The touring sedan and victoria models have built-in trunks of generous size which conform to the streamlined body design. In both the business and rumble-seat coupes, space for luggage and spare tire is located behind the seat. Additional space, reached from the outside, is also provided in the rear deck of the business coupe.



Brakes on the "400" are Bendix single anchor "equal action" type with indirect hydraulic actuation, the cam lever being connected to the piston rod of a single piston hydraulic cylinder mounted on the backing plate

Ayres Fathoms Depression Cause in New Monograph

Discovery of the long-sought cause of business booms and depressions is claimed in an economic monograph just published by the Cleveland Trust Company. The publication is entitled "The Chief Cause of This and Other Depressions," and the author is Col. Leonard P. Ayres, vice-president of the bank.

The most important conclusion of the study is formulated in the statement that: "Trade cycles are chiefly caused by changes in the volume of purchasing of durable goods by business enterprises, actuated by changes in the prospects for profits."

This conclusion is based on new data covering the production and distribution of goods which show that the volumes of finished goods bought by business enterprises, as contrasted with individual consumers, are far greater than has been assumed.

More New Deal Ruins in the Making

by Julian Chase

PILED one on another on the road to recovery are tumbled ruins of the New Deal. Fallen monuments to the exponents of Reform or Ruin block the path of natural progress which would lead us from depression. Other monuments, like their collapsed and collapsing predecessors, are being erected on the sands of doubtful constitutionality. They are being engineered to conform to the formulas of political opportunism and are put together with the crumbling mortar of arrested thought mixed with the craving for self-exaltation.

Industry, in whose strength lies the only salvation for our self-appointed saviors, stumbles on, bruised and battered by blows from New Deal bludgeons. It struggles over one heap of wreckage after another only to find more obstacles set on the path which should be cleared for it instead of cluttered with political obstructions. Discouragement only is encountered where encouragement should be offered.

Without industrial well-being, measured in terms of production and profits, there can be no general prosperity. Without general prosperity there can be no New Deal perpetuation or even long continuation. That is a simple fundamental which, it would seem, should be most easily grasped by shrewd politicians. Apparently it isn't. Apparently the outstanding fact which has force and effect in the consciousness of our present legislation and administrative leaders is that organized groups of prospective voters have political potency. It is difficult otherwise to account for the enactment of laws like that prescribed by the Wagner Bill.

When will the New Deal misalliance of quasi Mussolinis, Hitlers and Lenins and just plain demagogs learn that without profits there can be no taxes and without taxes there can be no vote-making handouts, that government for a time can take what it needs or wants but, without profits, there will not long be anything to take? When will it be realized that the most fertile tax producing soil is in the fields of industry? When will it be recognized as political expediency to see that these fields are adequately cultivated and irrigated so that they may not be raised by the wild winds of radicalism into another economic dust storm?

The economic arguments against the provisions of the Wagner Bill have been fully presented. Congress has had ample opportunity to digest and be guided by the sound thought of those who, in a world of reason and common sense, would be regarded as qualified to speak on the subject with authority. Congress has, however, turned its ear to professional leaders of an organized labor minority and has chosen, apparently to make the Government a recruiting agency for that organization whose leaders feed on membership fees.

The next arguments pro and con will be of a legal character. A more attentive hearing will be had and it seems reasonable to expect that the arguments against the law will eventually win. Meanwhile we may certainly expect more rather than less labor trouble, further derangement of business, another effective brake on recovery. It has been suggested that a proper title for the Wagner Bill would be, "A bill to handcuff business in its relations with labor, to turn over control of labor to the politicians of unions and government and to postpone recovery indefinitely."

Ho! hum! And the New Deal ambles on.

Men and Machinery

Six Years' Advance in P

SIX years have passed since the last machine tool exposition was held in the stirring days of 1929. This relatively brief period has witnessed the most remarkable development in machine design that the world has ever known. Truly we have been moving on the wings of inventive genius. Some of this development has been charted in these columns but much of it has not been disclosed so far outside of definitely restricted circles.

Back in 1929 the whole metal cutting industry was stirred by the introduction of cemented-tungsten-carbide tooling. That was easily the high spot of the exposition of that day. Since then, cemented-tungsten-carbide has given way to cemented-carbides in a variety of alloys suitable for specific metal cutting problems including the fast machining of steels. Other special tool materials have appeared on the scene, each finding its own place in the production scheme.

If the new tool materials had had no other effect upon machine shop practice than the revolutionary change in machine tool design which followed, they would have been entitled to a special niche in the hall of fame. Production men were suddenly shown a vista of a new day in metal cutting — greatly increased speed, deeper cuts, freedom from trouble due to scale, better surface finish, and the ability to machine metals possessing desirable properties but which could not be cut economically theretofore. In 1929 these accomplishments were but possibilities; they were unattainable without the development of machinery capable of high speeds, faster feeds and the massiveness associated with great rigidity and freedom from vibration.

The six-year period dating from the last machine tool exposition has been brightened by a steady flow of new machinery capable of higher speeds, faster feeds, great rigidity. But that's only a part of the story. The new equipment incorporates many other features of even greater importance. We might cite such things as closer tolerances, simple controls, better cost-reducing possibilities.

Few men are cognizant of the sum total of these advances, still fewer have been in a position to take advantage of the new equipment suitable for their particular operation.

The exposition which is to be held this year will make it possible to take in the whole panorama—to see everything under one roof—to compare competing processes without costly experimentation. There is neither time nor space here to detail the gamut of production equipment available today. Consider surface broaching alone. Here is a process of unplumbed potentiality which may be applied in an amazing variety of ways. It came first as a mass production process, applicable commercially only on repetitive operations. Now it can be used even in lot production through the availability of flexible, universal type broaching machines.

by Joseph Geschelin
Detroit Technical Editor,
Automotive Industries

Gear manufacture has seen a new day. Quiet gearing of an order of precision approaching master gears of another day has been brought within the cost-possibilities of even the lowest priced vehicles by lines of gear cutting and gear finishing equipment newly placed on the market. There is a choice of gear grinding for those who must get the utmost, possibly at a somewhat higher price, and alternative methods of shaving, lapping and other proprietary processes where low cost is a predominating factor.

Grinding for every application has undergone a revolutionary change; for camshafts, for crankshafts, for the gamut of parts — lower cost, better finish, closer limits. The centerless grinder, the internal centerless that permits grinding without any chucking provisions, automatic sizing devices, improved grinding wheels in greater variety, all contribute to an advance in the art.

A significant trend to metal stamping has followed the advances in press design. All-steel bodies, streamline forms, are made possible by the availability of huge, powerful presses which made their initial appearance in a few plants only last season.

Body production for 1936 will depend not only on such presses but also on the equipment which has been developed currently to facilitate die production. And in this category one must consider the jig borers and die sinkers that cut the cost of press dies and forging tools to a fraction of previous practice.

The significance of these changes and others too numerous to mention here must not be overlooked. Sociological and economic changes are felt at every turn and the race is to the swift. The very existence of vehicle builders and, even more particularly, their host of suppliers, depends upon the ability to produce the best possible product at the lowest possible cost, with requirements, in each case, becoming constantly more exacting. These requirements can't be met without the aid of new tools. Certainly the organization that takes advantage of them broadens vitally its opportunities. The truth of this statement is further emphasized by the unquestioned rise in labor costs. Only equipment of a new order can permit the payment of high wages while maintaining the essential low levels of cost.

All this is of the greatest import to automotive parts makers. They form the backbone of the automotive industry, comprising some three thousand plants catering not only to the vehicle builders but to the aftermarket. Here is an activity that has strained human resources, subject as it is to frequent and unpredictable style changes, subject to fluctuations in demand, forced to operate on a glorified jobbing shop

Production Tools

basis because of the variety of specifications of many customers.

As we have pointed out in recent months, this primarily important branch of the automotive industry has relied to a great extent upon the universal type of production equipment because it seemed to lend itself to frequent changes in tooling and set-up. However, the march of time has made this practice obsolete and uneconomical. Production men in parts plants will have to reckon with the flexible, unit-type equipment that is now available. With such tools it is possible to get approximately the same order of cost-reduction as with special single purpose machinery, and yet retain the flexibility demanded by lot production. And with these fundamental advantages, the unit-type machinery is no more expensive in the long run than universal equipment, since it can be amortized over long periods of time.

Judged on this basis, the coming exposition is not to be considered as a sales mart where certain makers can show their wares merely in an effort to spur the sale of machinery. Rather it is a great service to the metal working industry. It is a chance of a lifetime to see in one vast show the net result of the greatest wave of creative genius in a decade.

It is an opportunity to see all; to compare competing machines, methods and processes; to make at least a tentative selection of what one would like to test out on particular problems.

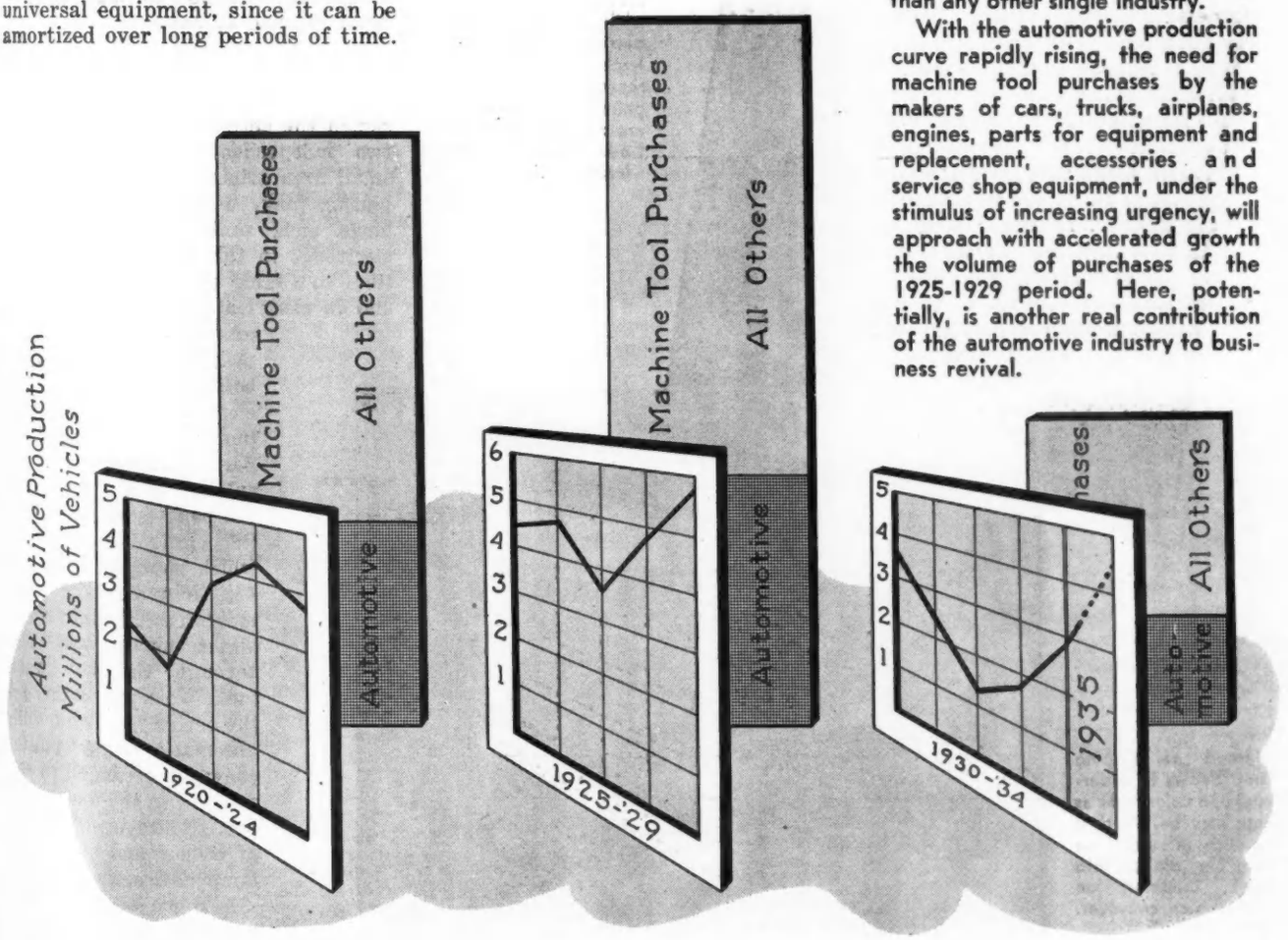
No automotive production executive, no automotive general executive, no automotive engineer, can afford to miss the exposition.

Machine Tools and the Automotive Industry

ARRANGED behind the charts showing the automobile production curves for the three five-year periods are bars which indicate approximately the expenditures for machine tools by all industry during those periods. The darker sections of the bars serve to give a somewhat rough estimate of the proportions of these expenditures which went for the purchase of machine tools for automotive manufacturing of all kinds.

Because of the ramifications and diversity of automotive manufacturing, permeating as it does through practically all industry, no accurate calculation of the value of machine tools entering into it is possible. However, taking only the more readily classified activities as comprised in automotive manufacturing per se, it is easily determined that the automotive industry is today and has been for many years past, by a considerable margin, a larger user and buyer of machine tools and plant equipment than any other single industry.

With the automotive production curve rapidly rising, the need for machine tool purchases by the makers of cars, trucks, airplanes, engines, parts for equipment and replacement, accessories and service shop equipment, under the stimulus of increasing urgency, will approach with accelerated growth the volume of purchases of the 1925-1929 period. Here, potentially, is another real contribution of the automotive industry to business revival.



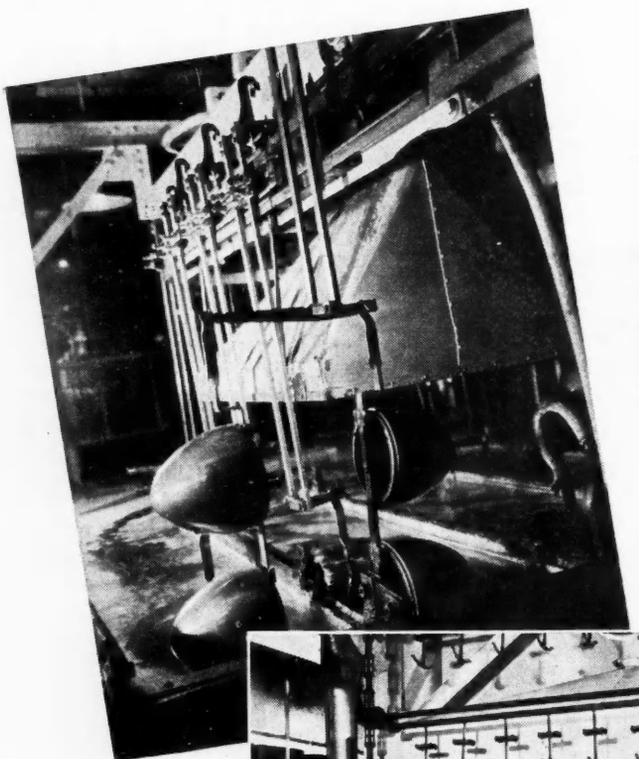
Lamp Bodies Rustproofed at Ford's Compact Flat

THE first large scale application for producing a paint-adherent and rust-resistant film in an alternating current bath is going full blast at the Flat Rock, Mich., lamp works of Ford Motor Co.

Here, incidentally, is one of Ford's decentralized industries out in the country—a unit small in size but a giant in capacity, producing more work per square foot than anything we have seen in our travels. Right now its output is limited only by the number of shifts that may be needed, but 7000 sets of head and tail lamp assemblies are just a fair day's work.

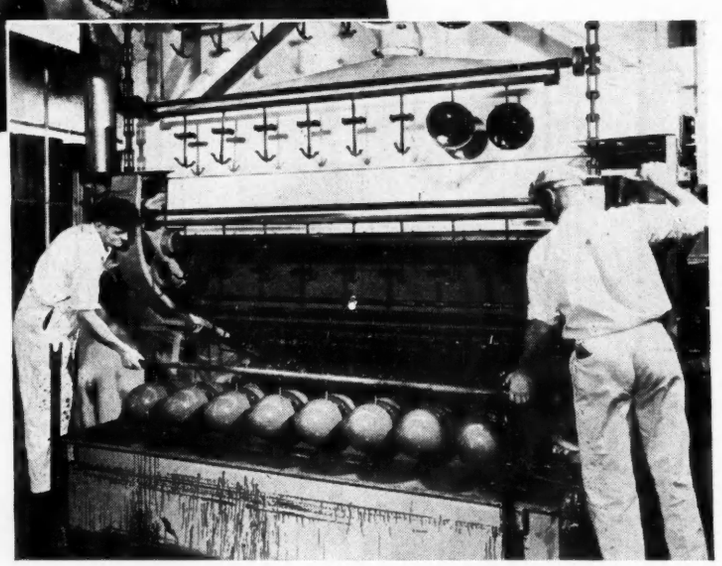
When Ford adopted synthetic enamel finish for the lamps, some few months ago, there arose the problem of fitting into this highly organized and beautifully mechanized unit the details of additional equipment and whatever new processes might be required for the change-over. Nor was this a simple matter considering the customary layout for metal cleaning, rustproofing, and enameling.

Much of the problem was simplified by the availability of the unique process of coating the sheet metal in a bath which develops a film possessing outstanding rust-resistant and paint-adherent properties. And, although the process is very fast, the quality of the finished product strikes a new high. While the minimum requirement set by Ford specifications is 300 hours in the salt spray without break down, the new lamp finish comprising the protective film, one undercoat, and one enamel coat, exceeds the par by many times, frequently running as high as 1000 hours without failure.



Here is method of mounting lamp bodies while moving through plating tank. Racks are hooked on mechanical conveyor. Note how the pairs of lamps are separated by the electrode which runs the length of the tank.

In detail the installation of the protective coating process is the very essence of simplicity. As shown in the sketch the entire process consisting of two independent units occupies the small area originally used for a large plating tank. Each unit consists of a large steel tank fitted with copper electrodes in the form of baffles, *EE*, three to a tank, which are supported by and in electrical contact with one end of the tank and a copper post, *P*, rising from the bottom of the tank. The electrodes clear the bottom of the tank and are perforated to permit circulation of the bath.



Method of dipping lamp bodies in undercoat and color tanks as case may be. Work is hooked in pairs on long bar, dipped into tank, mounted on drying oven conveyor.

Upon emerging from the electrolytic bath, in which the cycle takes only 4½ minutes, the work moves directly into a cold water spray and then through the hot water tank. Work moves through the entire cycle on a fully automatic type plating conveyor arranged to rise and fall in the usual manner. Conveyor hooks are of copper and carry four lamp bodies, two on each side Since good electrical

in AC Bath Rock Plant

conductivity is of utmost importance in this set-up, the contact points of the hooks are very carefully worked out to assure direct contact at all times. Care is taken to keep the hooks clean throughout the day.

The energized bath contains a proprietary solution of chemicals, chiefly zinc phosphate and a "toner" or oxidizer in definite proportions determined experimentally. The object of the "toner" is to convert whatever ferrous phosphate may be developed, into ferric phosphate which is insoluble and sinks to the bottom. In the present stage of development the generation of ferrous sediment is almost negligible.

Obviously the most important element of the operation is a careful control of the composition of the bath to assure standard conditions. Right now the bath is checked several times daily or more frequently depending upon the volume, by titrating, using a special graduate, to determine the percentage of iron oxide and zinc phosphate.

Electrically the bath is controlled by a special 250 KVA transformer and an oil type switch located at the tanks. The voltage impressed on the bath is 20 volts; current density varies from 35 to 50 amp. per sq. ft. A very significant feature of the bath is that a normal temperature of 155 deg. F. is maintained without the use of any auxiliary heating device since the heat generated by the resistance effect of bath and work is sufficient to keep the temperature within reasonable limits.

The bath is completely dumped at intervals depending upon the volume of work in process.

It has been found that this process aside from being so uniquely adaptable to the compact high production layout, has yielded many allied economies. For example, it has been found possible to dispense with the customary washing machine and use, instead, simply a quick hand wipe with a pad soaked with Sunoco spirits. This leaves a slight film which apparently protects the metal from instant contact with the chemical bath and has the effect of reducing the volume of ferric oxide.

Upon emerging from the bath the lamps pass through a drier and proceed to the paint department. For finishing, the lamp bodies are first prepared by wiping with chamois, then are hooked on the long bar which is carried through the drying oven. With the carrier held at both ends, the lamps are immersed in a tank containing the primer, held up for an instant to permit the excess to drip off, and then mounted on the conveyor for a trip through the oven.

After drying, the work rides an

One of drawing operations on lamp body.

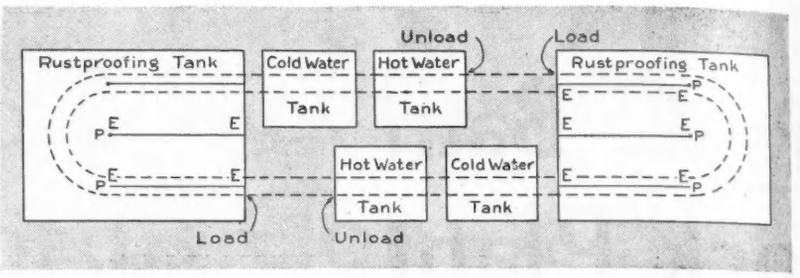
View of one of the compact final assembly lines. Note the merry-go-round conveyor on the table, carrying the lamp holding fixtures, one of which may be seen at the extreme left. Lenses and doors are on the belt above the table, reflectors may be seen on the monorail in the rear.

overhead conveyor to cool, and then goes into the finish enameling department. Here the work is lightly sanded, dipped in a tank containing synthetic enamel, and then goes through a drying oven.

Scheduling for color is handled rather ingeniously. The dip tanks are individual units fitted on the end of the oven conveyor and readily movable. Under the floor of the paint shop there is a floor conveyor system which carries separate tanks already made up in standard colors and these can be moved up under the dip station whenever a color change is required. Then the used tank is removed and a new tank lifted from the pit and substituted for it.

Between the prime coat and the final coat lamp bodies are given a light sanding by hand.

Going over the operations in this plant very hurriedly, we find that the head lamp body, a very deep drawing job, takes seven press operations to complete; of these, four are drawing operations. The edge for the rim is turned up by spinning. The surface of the lamp body is smoothly finished by burnishing, thus eliminating a belt sanding operation which was first thought necessary.



Sketch showing general arrangement of rust-proofing layout. Fig. 1 is a view of the rust-proofing tank.

Right after the operations in this section of the plant the lamps are ready for finishing, and arrive at the station where they are hand wiped and hooked on the conveyor leading to the rust-proofing bath.

It seems most significant to learn that when the work leaves the electrolytic bath and subsequent washing it is in perfect condition for enameling, requiring no cleaning operations of any kind.

The final assembly line which is illustrated here is a marvel of compactness, for the whole volume of lamps required by Ford is handled on this little stretch at the end of the line. The secret of the whole thing seems to reside in a careful sub-division of operations with enough men, sufficiently close together, to pick up the thread of the operation without an idle movement. Lamp bodies are picked off the overhead monorail and are set into fixtures mounted on the work table on a short merry-go-round line.

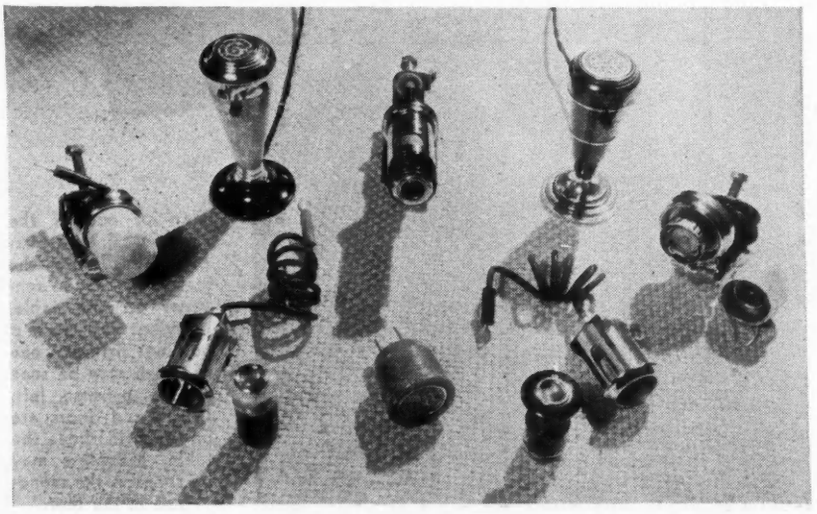
Lenses and doors come in on a flat belt above the table, while reflectors move by on still another monorail threading the assembly line. The small component parts such as sockets, bulbs, etc., are located in bins convenient to the operator's station.

Color in Automotive Accessories

BECAUSE of the increasing vogue for color in automobiles, automobile accessories are coming out in a great range of brilliant colors made possible largely through the use of the material Catalin.

The Casco Mfg. Company of Bridgeport, Conn., is one of the strongest promoters of this vogue for colors in automobile accessories. They recently put out fender guides of 12 in. and 15 in. lengths, whose slender chromium-plated rods are tipped by small polished Catalin pieces in brilliant colors and made egg-shaped.

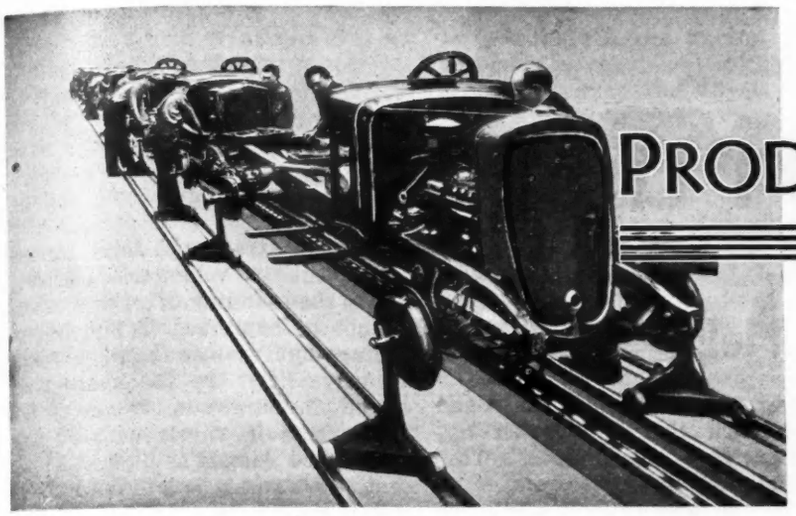
Cigar and cigarette lighters for a long time popular, primarily because of their utility, are newly appearing in marble-like effects of mottled ivory and beige. This is merely another form of Catalin which is now being made in veined effects to resemble marble, alabaster, jade and lapis lazuli.



The newest of the smart cigarette lighters have Catalin bull's eyes which fit over the heating coil. Their great advantage is their translucency, since the glow of the red hot metal shows through the Catalin the moment the coil is hot enough to provide a smoker with his light.

For some of these lighters an onyx-like translucent knob is used.

Gear shift handles, formerly made almost always in the round ball form, are now becoming established more and more in the convex top handle with a fluted edge. They come in mottled marble effects, referred to before, dark brown, green, yellow, red and many simulated natural stones, and are very decorative as seen from the driver's seat. These gear shift balls have several advantages besides that of attractive color. They are easier to see in the dark and, therefore, are effective for night driving.



PRODUCTION LINES

Ants Shun

This may be out of order because the trend is all to all-steel body construction. However, in the May bulletin of the *Copper & Brass Research Assn.*, we ran across a note to the effect that ants (at least the variety in the tropics) seem to shun copper. As a result all bungalows down there are now provided with copper-bound pillars. Maybe this means something to those of you who are building buses or truck bodies or something else for the tropics where white ants are a scourge.

Now the LAB

It stands for the Lubrication Advisory Board of the American Society of Lubrication Engineers recently established to advise people on matters concerning lubrication in any field of activity. Incidentally this organization has sent us a copy of Bulletin 59 giving the ASLE standards for E-P transmission and differential lubes. It is intended to elicit criticism and suggestions, so go to it.

Plastics Widen

Further development in colored plastics for autobody interiors is under way. One application is interior sun visors. We hear that a Dayton molder is working on garnish moldings in decorative effects to set off the interior. If this goes through it may change some of the window frame designs now in use.

Busy Days

Factory managers are on their toes these days keeping in touch with labor developments. Recent disturbances in Toledo, Cleveland, and other isolated spots surrounding Detroit have demanded leadership of a high order. Compromises are inevitable in the emergency. But out of this must come a better understanding of the mutual problems of labor and management.

Reports Progress

We talked the other day with one of our pals who recently took hold of a plant with instructions to get out production. Three months' work has resulted in boosting production in terms of double and triple previous performance on individual operations. Big problem for these days, at least, has been the adjustment of long-standing rates when output per machine is vastly increased. Thus far he has been able to convince his men that although the basic rate must be changed, the pay envelope is thicker. Which stamps him as a mighty smart operator.

Mineral Coated

You've heard about Murex, heavy mineral coated electrodes for heavy duty welding. Now Metal & Thermit tell the complete story in a handsome booklet. Evidence for the engineer and metallurgist; production data and procedure for the engineer and fabricator. Commercial steels, new alloy steels, and stainless steels are covered. Ask us.

Rotary Valves

Revival of interest in rotary valve gearing is evident in several quarters. One design, a recent development mentioned by us, is being investigated by several car makers. Prominent aircraft engine builder is playing with rotary valves on a radial engine. Big advantage here is reduction of frontal area proportional to reduction of diameter by almost 9 in.

Knows Them

Easily the most impressive thing we have witnessed occurred at the Seaman body plant recently. We were going through the plant with a number of the Nash executives including C. W. Nash. Evenually we missed him. On the way back, there he was engaged in spirited conversation with two old-time trimmers telling them how he used to do it way back when. Mr. Nash claims to be one of the oldest automobile workers in the business, having started 43 years ago. They tell us that he knows most of the men in the shops and thinks nothing at all of stopping a busy line to chat with one of the boys.

New Deal

This season marks a revolutionary shift in purchases of parts and raw materials for car production. With probability of at least two car announcements before the end of June and practically industry-wide announcements by October, peak of production curve is moved right into summer season. Wave of buying and parts production schedules will be at its height in period of customary doldrums.

Multiple Springs

Nested springs save space says the April issue of *The Mainspring* (Wallace Barnes). There's an interesting technical discussion on nested helical springs with charts showing carrying capacity and allowable unit stress. A good one to add to your literature on spring design.

J. G.

MANUFACTURING MANAGEMENT METALLURGY

The Forum—

Streamlined Valves Do Help

Editor, AUTOMOTIVE INDUSTRIES:

In the May 11 issue of *Automotive Industries* I notice under the heading "Production Lines" that you raise the question of the possible value of "streamlining" valves.

During 1930-31 I did a research thesis at the Massachusetts Institute of Technology bearing the title of "Inlet Valve Design" in which I endeavored to answer the very question you raise. Hence, it might not be amiss to recount some of the conclusions arrived at both analytically and by means of many hundreds of volumetric tests.

Standard inlet valves of 1½-in. nominal diameter were used with seat angles of 30, 45, and 60 deg. Lifts were varied from 1/32 in. to ⅜ in., while suction heads were varied from 0 to a certain maximum which varied with the particular valve and lift used.

Tests were run first with the standard valves to obtain a basis for comparisons, and then the various edges were rounded off to a radius of 1/16 in., one at a time.

It was found, first of all, that there is a definite lift below which the flow of air is turbulent, and above which the flow of air approaches true streamlines. This dividing point appears to be affected only by the size of valve and the design of the gas passages through which the gas approaches the valve. It seems to be independent of velocity or any other consideration, such as seat angle, temperature, etc.

While a rounding off of the various corners of a valve does not appear to influence the position of the "critical lift" or the point which divides turbulent from streamline flow, this rounding off nevertheless has a very definite value in reducing the turbulence at all lifts.

Since the flow of air through an annular orifice such as between a valve and its seat follows a law expressed in exponential form, the improvement in volumetric efficiency due to the rounding off of the corners cannot be expressed in simple percentage figures over the whole range of valve lifts. In the above mentioned investigation, however, improvements in valves with 49 deg. seat angles ranged as high as 14 per cent. This surely is an improvement worth having, especially when it is considered that the cost of obtaining it is nil.

It must not be forgotten, of course, that there is a small reduction in the nominal seat area; I do not believe this to be of moment, however, since the effective seat area is considerably smaller than the nominal seat area anyway, and the very edges of the valve do not seat anyhow.

Finally, answering concisely your question: "Is there any virtue in streamlining the course of the flowing gas stream?" The answer is "Yes."

PETER L. LOEWE

Cylinder Wear Measurement

Editor, AUTOMOTIVE INDUSTRIES:

The article on "Cylinder Wear Measurement by Iron Content" in your April 6 issue was read with a great deal of interest, and it would appear that the colorimetric method of determining the iron content of crankcase oils represents a distinct contribution to the industry.

We wish to call your attention to what appears to be an erroneous statement in the fourth paragraph of this article. To the best of our knowledge, Prof. Howard H. Langdon, of Washington State College, did the first work on the subject of iron contamination of lubricating oils as an indication of wear. The results were published in the monthly bulleting of the State College of Washington, Vol. 15, July, 1932, No. 2. It is true that this antedates Boerlage and Gravensteyn's article in the *British Motor Ship* for August, 1932, by only one month, but, nevertheless, we believe your attention should be called to this fact.

We are somewhat surprised that this point was overlooked, inasmuch as it was our impression that Professor Langdon's work was quite widely known, since it had been the topic of discussion throughout the petroleum industry for several years, and indicates a definite superiority of the paraffinic type lubricant over the so-called Western, or naphthenic type of oil.

Union Oil Company of California,
E. W. HUTTON

The Car Suspension Problem

Editor, AUTOMOTIVE INDUSTRIES:

As an aeronautical engineer I have been interested, not, as might be expected, in the turbulent subject of car streamlining, but in the subject of car suspensions and unconventional layouts.

Since the airplane usually has an independently sprung three-wheeled undercarriage with surprisingly good riding qualities, considering speeds and operating terrain, I trust that this will be considered sufficient warrant for me to enter the discussion.

If some of the journal and trade-paper articles are to be believed, the ride will be improved by such divergent acts as placing the engine over the front axle, placing the engine over the rear axle, making K^2/ab or AB/K^2 equal to something, locating the c. g. one-third of the wheelbase ahead of the rear axle, locating the c. g. high to prevent skidding, etc. Even the three-wheeled vehicle is dragged forth for new and ingenious reasons.

For the benefit of the three-wheelers it should be pointed out that, unlike the conventional automobile, there is produced a definite rotating couple when one wheel

drops into a hole or passes over an obstruction. The fourth wheel introduces a stabilizing redundancy. The three-wheeled vehicle is inherently a poor-riding proposition, and, with rear steering, inherently unstable. The airplane taxies without considerable roll due to the great inertia of the wings, and the long wheelbase reduces the pitch.

It would seem that outside of the complex spring problem the principles of arrangement and suspension can be reduced to a few simple fundamentals.

1. The masses which comprise the automobile should be distributed in a horizontal plane as far as possible from the center in such a manner as to give the greatest moment of inertia about the fore and aft and lateral axes.

2. Passengers should be as close as possible to the center of the automobile, consistent with roominess, to reduce the effect of any wheel's passing over an irregularity of the road surface; present trends are in this direction.

3. Put the passenger's eye where psychology dictates, but locate all masses as low as possible consistent with proper ground clearance, to reduce the magnitude of upsetting couples generated in turns and skids; this is of particular importance with independent suspensions. With conventional axles locate the spring attachment points to the running gear as far from the plane of symmetry as possible.

I trust that the foregoing "wonderful grasp of the obvious" will be pardoned by your more technical readers.

H. D. HOEKSTRA

Modern Racing Cars

Editor, AUTOMOTIVE INDUSTRIES:

In your Feb. 2 issue there is an article in "Abstracts" dealing with modern racing cars, in which several inaccuracies occur.

It is stated that Archangeli was killed at Monza on a dual drive 12 cylinder Alfa Romeo. Archangeli was not killed at Monza, but on the Montlhery track, near Paris, and he was not driving an Alfa Romeo, but a 12 cylinder Maserati. Further, this car did not have two propeller shafts, but was quite normal so far as its transmission was concerned.

A few years ago Borzacchini brought this particular car to Indianapolis, but although it undoubtedly had speed, for it had held the world's 5-kilometer record for several years, it failed to make a showing on the Hoosier track.

The article in question seems to indicate that Alfa Romeo built only one racing car with two drive shafts —the model on which Archangeli did not kill himself. This in incorrect. The international racing rule calling for a wide body with only one man aboard, Engineer Jano, of the Alfa Romeo Co., produced a car with two diagonal drive shafts, the differential being just behind the transmission and the bevel gears close to the rear wheels. The obvious advantage was that the driver could be set much lower, between the propeller shafts.

Numbers of these cars were built, probably 20 in all, and for three years they proved themselves the fastest road racing machines in the world. It was not until the latter half of 1934 that they were eclipsed by the new German racing cars.

The reason for this was that the international racing rule fixed a maximum weight of 1653 lb. empty without tires. Until the German cars came along, it was not possible to exceed a piston displacement of about 183 cu. in. and keep within the weight limit. By adopting aviation practice and the extensive use of light alloys, the Germans were able to push piston displacement up to nearly 300 cu. in. and to produce cars which have attained the speed of 200 m.p.h. on the straightaway. Alfa Romeo was then outclassed and decided that new cars would have to be built. These, however, cannot be in racing trim before the middle of the present year.

To meet the immediate situation, Alfa Romeo is producing a car with two engines, one in front and the other at the rear, the driver being seated between them, with the gasoline tanks by his side. This will be driven by Nuvolari, and is expected to make its appearance in the Tripoli Grand Prix (Northern Africa) early in May. This race is run on the fastest road racing track in the world.

W. F. BRADLEY
Paris Correspondent,
AUTOMOTIVE INDUSTRIES

Mr. Dumas, who checked the Maserati car at Indianapolis for the A.A.A., says it had a 16-cylinder engine.—*Editor.*

Compressor Terminology

Editor, AUTOMOTIVE INDUSTRIES:

Referring to page 646 of your May 11 issue, there is a test curve accompanying the article on the Bendix Rotary Vacuum Pump which I believe requires correction.

One of the curves, entitled "displacement" is plotted against speed. We believe this to be an error, probably in terminology. The displacement of the compressor varies directly with speed and is always a straight line in such a plot. What has been plotted is delivery, evidently; since by dividing the values on this line by the volumetric efficiency, we get a real displacement curve, which is a straight-line plot against speed, as it should be.

The reason I have called your attention to this error is that the use of the term "Displacement" for this purpose is apt to be misleading and is not in accordance with standard terminology; for example, as found in the American Society of Mechanical Engineers Power Test Codes on Compressors.

R. J. S. PIGOTT

* * *

ALUMINUM cylinder heads are becoming an important factor in European competitions. It is reported in *Revue de l'Aluminum* that of the 20 leading vehicles in the general classification in the Monte Carlo Rally, 70 per cent were equipped with aluminum cylinder heads. More recently the winner in the Women's Rally at San Raphael also drove a car with aluminum cylinder head.

* * *

THE consumption of motor gasoline in France during 1934 amounted to approximately 870,000,000 gallons, of which 825,000,000 gallons were consumed in private motor vehicles, 27,800,000 gallons in motorcycles, 3,970,000 gallons in military vehicles, 3,070,000 gallons in aircraft, and 9,650,000 gallons in motor boats and stationary engines.

Selective-Solvent Focus of Interest

Viscosity Indices and Sludging Characteristics of Oils from Asphaltic Crudes Are Improved.

FROM the papers presented at the mid-year meeting of the American Petroleum Institute, held at Tulsa, Okla., May 15 and 16, it is quite apparent that a great deal of work is being done by the petroleum industry with a view to improving lubricating oils, particularly those from asphaltic crude oils.

For a long time there was a great deal of mystery as to the qualities particularly desirable in lubricating oils, and even today the subject is by no means fully cleared up, as is indicated by the extensive use of such terms as lubricity and oiliness, for which there are no simple definitions. But it is generally agreed that two qualities highly desirable in an oil for internal combustion engines are a high viscosity index, that is, a low rate of change of viscosity with change in temperature, and a high resistance to oxidation or sludging. A low carbon residue is also desirable.

Some years ago it was found that by treating lubricating oils with certain solvents some of the undesirable constituents could be removed therefrom and the essential physical properties of the lubricant improved. These processes are known as selective-solvent processes, and from the papers at the mid-year meeting it is quite apparent that much work has been done recently in the development of such processes. In fact, three papers were presented on the subject, dealing with three different processes.

One of these papers, by D. B. Williams of the Carbide and Carbon Chemicals Corporation, dealt with recent developments in the Chlorex process of selective-solvent extraction. This process was brought to the commercial stage by the Mid-Continent Petroleum Corporation and the Standard Oil Company (Indiana), both companies having proceeded independently and without knowledge of the other's work. The sole manufacturer of Chlorex (which is the trade name for $\beta\beta$ dichlorethyl ether), has received an exclusive license under an agreement with Mid-Continent and Standard Oil (Ind.) to sell Chlorex to other refiners as a selective solvent in refining lubricating oils, and purchase of the material carries with it the right to use it in the patented refining process. There are at present seven commercial plants operating the Chlorex process.

Just what the Chlorex process does to the oil is brought out by a table of physical properties of a stock subjected to it (which happened to be an oil made from a Pennsylvania crude) and of the refined product resulting from the application of the process. It may first be pointed out that the yield of the process was 92.1 per cent, the resulting "raffinate" having 92.1 per cent the volume of the stock used in the process. In this case the carbon residue was reduced from 0.03 to 0.01 per cent; the Sligh oxidation number was reduced from 28.4 to 3.4, and the viscosity index was increased from 109.1 to 117.5.

Another paper, by G. R. Bryant of the Indian Refining Co. and R. E. Manley and B. Y. McCarty of the Texas Co., dealt with the furfural process of selective-solvent refining. Furfural is a liquid obtained by the distillation of bran and similar substances, which has a boiling point of 323 deg. F., a freezing point of minus 34 deg. F. and a specific gravity of 1.164. Furfural is said to have a number of desirable qualities as a selective solvent for lubricating oils, being chemically stable at the highest temperatures used in petroleum stripping processes and available in large quantities at relatively low cost.

Furfural Refining in Operation Since 1933

The original work on furfural refining was covered in U. S. patent No. 1,550,523, issued to Eichwald. During 1931 laboratory work was started to establish the commercial possibility of furfural as a selective refining solvent, which was continued during the following year. In 1933 a plant was installed in the refinery of the Indian Refining Company at Lawrenceville, Ill., which has been in practically continuous operation ever since, handling exclusively distillate oils derived from pipe-line Mid-Continent crude by vacuum distillation. They are solvent-dewaxed with acetone-benzol after furfural refining, and subjected to finishing operations for the production of a suitable color and cast.

The viscosity indices and other characteristics of the oils now produced by this plant are considered sufficiently high for present market requirements. An increase in the solvent dosage and modification of operating conditions would result in higher viscosity indices, but this would involve a further sacrifice in yield and increased cost of operation, which are not considered justified at present.

In a paper by Malcolm H. Tuttle of New York it was pointed out that while many solvents had been introduced to remove undesirable constituents from lubricating fractions of petroleum, including phenol, nitro-benzene, furfural and Chlorex, none of them could produce from the whole lubricating fraction, without regard to the quality of the crude, lubricants meeting the highest requirements as to quality. Some, he said, were ineffective in lowering the carbon residue or coloring matter, others in reducing sulfur. This led to the development of the Duo-Sol process. The basic principle of this process is that propane as a paraffinic solvent is used in conjunction with a naphthenic solvent. Cresylic acid is the chief constituent of the naphthenic solvent called Selecto, which is used in this process.

A paper on Service Characteristics of Motor Oils as Related to Composition was presented by David R. Merrill, C. C. Moore, Jr., and Ulric B. Bray of the Union Oil Co. of Calif.

In discussions of the characteristics of lubricating oils refined by the use of selective solvents, the question is sometimes raised as to whether such solvents

Process Oils at API Meeting

may not remove certain useful components, thereby making the oil deficient in lubricating quality or oiliness. In this paper data are presented on the service characteristics of some commercial lubricating oils and of lubricating-oil fractions representing typical classes of components. From these data the conclusion is drawn that the removal of the less paraffinic fractions by the use of selective solvents results in an improvement in the lubricating value of the oil as well as in other characteristics.

Engine wear was determined by ascertaining the amount of iron that had accumulated in the crankcase oil during a certain mileage, the amount of iron in the oil being evaluated by a colorimetric method similar to that recently described in *Automotive Industries*. A formula is derived for what is called the "wear index," the milligrams of iron collected in the crankcase in 1000 miles of service. It is stated that when the engine is new, a breaking-in period of 5000 miles of normal operation is required before consistent wear values can be obtained.

After preliminary tests had shown that this method would give dependable results, a series of tests was made on a motor-dynamometer with a small six-cylinder engine, using typical eastern and western oils and an experimentally produced solvent-process oil from California waxy crude oil.

The results obtained, presented in tabular form, definitely segregate different types of oil with regard to their wear-reducing ability. The eastern oil and the solvent-process oil have generally similar wear-index values, while the typical acid-treated western oil from asphalt-base crude shows a definitely higher rate of wear.

Since tests under laboratory conditions do not always agree with results obtained under actual service conditions, a test was made with 20 passenger cars and light trucks of one of the large public utility corporations in Southern California. The cars were run under routine service conditions for successive 1000 miles, first with one or the other of two well-known brands of oil produced by acid treatment of distillate from California low-pour-point crude oil, and then with a solvent-extracted oil commercially produced from California waxy crude. A comparison of the wear-index values obtained in the fleet tests and in the motor dynamometer tests indicates values more than ten times as great for the fleet test. This is undoubtedly due to the fact that in the dynamometer tests the runs were continuous, while in the fleet tests the driving was intermittent, hence in the latter case there was more opportunity for wear due to corrosion caused by the acidity of condensed products of combustion. But while the wear was much greater in the fleet tests, the average wear with western or naphthenic oils was about 60 per cent more than that with paraffinic-solvent-process oils produced from California waxy crude in both the laboratory and the fleet tests.

Research—The Pathfinder of Science and Industry

RESEARCH usually holds great fascination for those who are engaged in it, and it also can be made the subject of a fascinating discourse, if the author has the ability to write interestingly. T. A. Boyd of General Motors Research Division, whose new book on "Research—The Pathfinder of Science and Industry" was mentioned in a recent issue of *Automotive Industries*, evidently possesses this ability, for the volume produced by him is a very readable one. It deals with every phase of modern scientific and industrial research and should be of particular practical interest to young men who may be contemplating a career as research scientists, as well as to manufacturers or institutions planning the establishment of research laboratories. The problems, methods and results of research are illustrated by numerous examples and by quotations from men who have made a name for themselves in this field of activity.

According to Mr. Boyd, research consists merely in searching for new knowledge or in trying to improve something, and there are examples of it in many different walks of life, although the term is not generally applied to most of these activities. Some would restrict the use of the term to investigations in the field commonly called science, but Mr. Boyd thinks this restriction on its use is not justified.

After tracing the beginnings of research, the author devotes a chapter to the subject of "Pure and Applied Research," in which he shows the very close relation between the two. In fact, "rarely can a job of applied research be completed without doing something which, if done for its own sake, would be classed as pure science research." In another chapter on "Evolution" it is pointed out that the research work required to develop the products of an industry changes in character with advancing age of the industry. As long as an industry is still in its infancy its products generally can be materially improved by making use of information already available, but this no longer holds when the industry becomes more mature.

One feature of the book that adds to its readability is the fact that the subject matter is divided into numerous short chapters. In one of these chapters, dealing with organization, it is brought out that whereas in past centuries great discoveries were made and notable industrial achievements accomplished by individuals, today the unattached investigator is handicapped, and organized effort is necessary. Laboratories and instrumentation each have a chapter devoted to them, and of the remaining chapters the majority deal with some phase of activity of the research worker. Before experimental work is undertaken it is well to study the literature of the subject to see what others have been doing along that line, but the investigator should not allow anything he sees or hears to discourage him or stifle his originality. One thing

that a research man needs above all else is a keen sense of observation, and numerous instances are given of important scientific discoveries or industrial inventions which were developed from random observations.

Research work naturally costs money, especially now that elaborate equipment is generally required, and the various methods of financing research are discussed at length. That adequate financing is a great help in accomplishing worth-while results the author believes to be shown by the fact that of the 10 Nobel prizes for scientific work granted to Americans to date, five have been awarded to men associated with one or another of the excellently organized and adequately financed research institutions supported by the John D. Rockefellers.

Other chapters deal with the training and essential characteristics of the research worker, the recruiting of research staffs, the production of new poducts and development of new industries by research, and the concurrent destruction of old ones. In view of the recent discussions of alleged dire results of "mechanization," it is quite appropriate that one chapter should be devoted to the humanitarian "dividends" of research. In the final chapters the remuneration of research men and the penalties of pioneering are discussed.

Throughout the book the problems discussed are illustrated by numerous examples from the history of science and invention, and any one reading the volume cannot fail to add to his knowledge of scientific history.

Mr. Boyd's book is published by D. Appleton-Century Co., New York, N. Y. The price is $2.50.

Predicts General Use of Synthetic Enamel on Big Production Jobs

IT is very probable that the "Big Three" motor car manufacturers will adopt baked synthetics as a standard production finish, but we do not believe that the other manufacturers, with a smaller output, will make this change. Any saving in labor or material costs compared with lacquer would not be worth while against a limited production. It means a capital investment in new progressive tunnel baking ovens, air conditioning, etc. Furthermore, it is yet to be proven that synthetics have any better or longer durability on outside exposure than properly formulated pyroxylin lacquers.

As far as the repaint or custom shops are concerned, the majority of these are not in a position to make the expenditures necessary for a well-ventilated, dust-proof room. Then, too, their public demands the ultimate speed in drying that only lacquers can give, and also the fact that lacquers are still the only material that can be perfectly patched or spotlrepaired.

We believe that the ultimate finish will be a combination of lacquer and synthetic combining the advantages of each without the disadvantages of either, and our laboratories have spent years in the development of such a product. It is now available for commercial use. We might say that we have never introduced a line that has had the immediate acceptance with the consuming trade as a product of this character. It has the natural quick drying of lacquer, which eliminates picking up of dust and dirt in the film, and because of its nitrocellulose content it is perfect for spot-repair work. While the natural gloss is not as high as that of an air-drying synthetic, the gloss of a combination lacquer and synthetic is equal to baked synthetic finish such as we would find on the Ford cars, thus making it ideal for touch-up.

While it does not have the exceptional build and covering of a straight synthetic, its actual film-forming material represents an increase of from 25 to 40 per cent over the common automotive lacquer, which, of course, gives the consumer a much greater value for his dollar, reducing the material cost per gallon.—Extract of paper read by E. W. Windsor of the Sherwin-Williams Co., March 22, at the Sixth Annual Automotive Service Conference, Purdue University.

Koroseal—A New Synthetic Material Whose Properties May Be Varied Widely

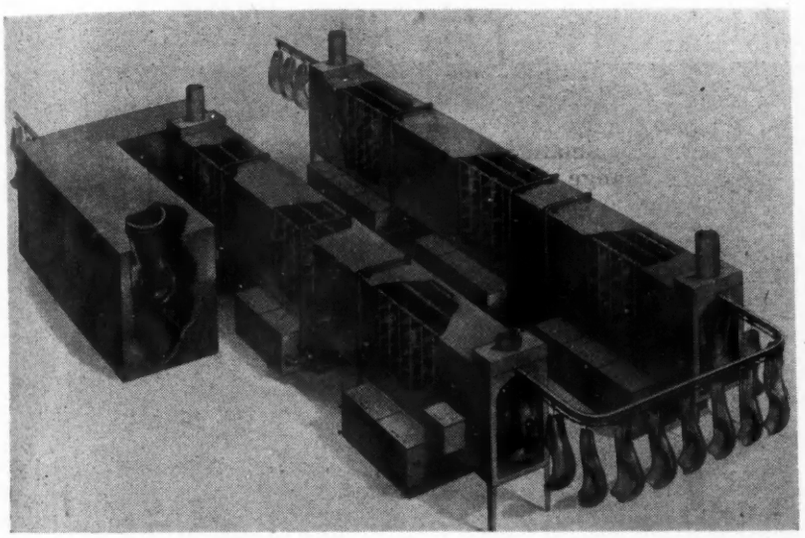
A NEW class of synthetic materials known as "Koroseal" was described in a paper presented to the Division of Industrial and Engineering Chemistry of the American Chemical Society at its recent New York meeting by S. L. Brous and W. L. Semon of the Chemical Research Laboratories of the B. F. Goodrich Co. Koroseal is the name of a large class of compositions with properties varying from those of hard rubber to those of jellied rubber cement, embodying modified, substantially insoluble polymers of vinyl halides. Halides are binary compounds of the elements of the halogen group (bromine, iodine and fluorine) and the term "vinyl" signifies that these elements are combined with the radical CH_2CH. By varying the composition and the method of processing, a variety of useful rubber-like substances has been produced, the physical and chemical properties of which may be varied widely by compounding, and particularly by the choice of plasticizer. Plasticizers or relatively non-volatile materials, and solvents are used in the preparation of the compounds, together with a third class of materials, known as pigments, which are added to modify the processing or to change the appearance of properties of the finished product. In its compounded form, Koroseal is a translucent material whose color varies, with the choice of plasticizer and with the extent of milling or molding, from a pale amber to a dark brown.

Koroseal behaves like rubber in that it forms highly viscous solutions, but is unlike rubber in that milling of the stock does not reduce the solution viscosity. The solids content of the solutions normally used is approximately 10 per cent by weight. Since gelation occurs on cooling, these solutions must be used at or near the boiling point of the solvent. However, even with this limitation Koroseal is said to offer commercial possibilities in fields such as impregnation and coating of fabrics, coating of metal parts such as plating racks, and coating of paper. An excellent impregnation of tire cords is said to be obtainable with a Koroseal solution, as compared with rubber latex of the same concentration.

As a gasket or sealing member working in oil, Koroseal has been adapted to many uses. Notable among these are drip-proof service in flanged oil piping operating at 150 lb. per sq. in. pressure, and sealing members on reciprocating pistons, where, after 17,000,000 4-in. strokes, no leakage could be detected.

Koroseal tubing has been used in the laboratory for transferring chlorine gas, ozone and sulfur chloride, in which service it shows no apparent deterioriation.

NEW DEVELOPMENTS
Automotive Parts, Accessories and Production Tools



Bonderizing Process With Spraying

To meet a wider variety of production applications in the finishing of sheet metal parts, the Parker Rustproof Co., Detroit, Mich., has supplemented the well-known immersion Bonderizing process with a spraying set-up, Spra-Bonderizing. The new process chemically produces a typical rust-resistant phosphate coating that provides an adherent base for paint, enamel or lacquer. This is accomplished by spraying the processing solution on to the work as it passes through the Bonderizing section of a completely mechanized conveyor line, including cleaning, Bonderizing, rinsing and drying.

This is said to produce coatings at lower temperatures and lower chemical concentration than has been possible by an immersion process. The pressure spraying accelerates the chemical reaction and produces both a cleansing and coating action in one operation. Processing time has been reduced to sixty seconds as against two to five minutes by immersion.

As the work progresses on the conveyor line through the various steps of cleaning, Bonderizing and rinsing, it passes a series of small standpipe sprays which force the solution against the material from every conceivable angle, flooding all areas to be treated. The equipment is assembled in a steel housing with reservoirs below, where solutions are accumulated, ready for circulation.

Zee-Lock Milling Cutter

The Ingersoll Milling Machine Co., Rockford, Ill., has brought out a zee-lock milling cutter design in which the cutter blade is securely retained in the cutter body by zee-shaped wedges. The construction may be adapted to many types of cutting tools. The illustration shows an Ingersoll face mill which is available for medium duty, heavy duty, and extra heavy duty as specified.

Cutter blades for this purpose are supplied in forged high-speed steel, super-cobalt high-speed steel, Haynes J-Metal, or cemented carbides. Cutter housings are of forged and heat-treated chrome molybdenum steel.

As shown, the cutter blade is securely retained in the housing by a zee-shaped wedge. The wedge hooks the front of the cutter body and the back of the blade. It is impossible for the blade to shift backward or inward away from the cut. The back hook of the wedge is on a slant so that when the cutter blade is reinserted and moved out a serration, it moves forward a slight amount, compensating for face wear. The main adjustment is outwardly or radially, which is the main wear, as a cutter wears in the direction of feed. No additional parts are required for resetting. The blade adjusts itself automatically in the direction of wear.

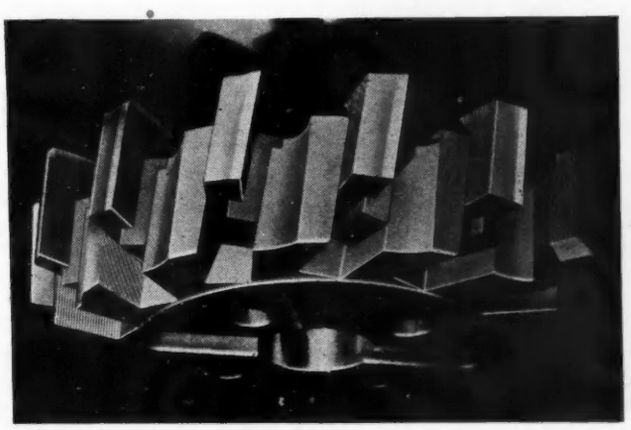
Grob Open End Band Saw

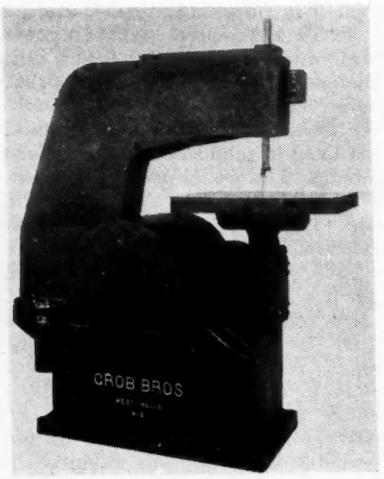
Adding to their line of continuous-motion filing machines, Grob Brothers, West Allis, Wis., have placed on the market a band saw for internal sawing in the manufacture of tools and dies.

The principle of the machine is the winding up of a 150-ft. saw band helically over a drum and looping it over three guide sheaves, arrangements for forward motion at cutting speeds, reverse motion at high speed, and facilities for the quick set-up to do internal sawing.

To saw out a die it is only necessary to release the tension on the saw band, which is done by a single lever movement, remove the front end of the band fastened with a self-tightening eccentric clamp to the drum, insert it through an opening in the die large enough for the band to pass through, reconnect it to the drum and put tension on the band. The time required to do this is about half a minute. Three minutes of sawing can be done at the lowest cutting speed until the end of the band has been reached, at which time the machine will automatically stop. Only 18 seconds is required for the return of the band to be again ready for another three minutes of sawing.

The drum is mounted on a threaded





spindle so that when revolving it screws itself back and forth, winding and unwinding the band. The drum is tapered to compensate for the saw band being heavier on the front or teeth side. A small guide wheel covered with rubberized fabric is holding the saw band tight to the drum when the tension of the band is released. This prevents the band from loosening on the drum. All revolving members are made of aluminum. The light weight makes a high reverse speed possible as also a quick stop.

The machine has four cutting speeds, 50, 75, 100 and 150 ft. per minute to the saw band, and one reverse speed, 500 ft. per minute.

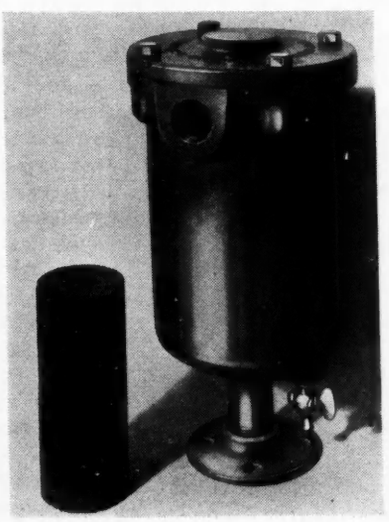
Two motors mounted in the base are used, a variable speed motor for the forward and a single speed motor for the reverse motion. The driving is done by means of multiple "V" belts.

The total weight is 2000 lb. and overall height is 74 in.

New Adams Air Filter

An air filter recently placed on the market by the R. P. Adams Co., Buffalo, N. Y., makes use of a new principle in the separation of water, oil and other foreign materials from compressed air. It is a combination of centrifugal separation and diffusion through a highly porous filter medium which retains its shape even though completely saturated. The air enters through an orifice located on the upper rim of the shell and circles around the inner rim at high velocity throwing out the oil, water and other liquid entrainment into vertical slots. As the air slows down in velocity, it approaches the center axis and passes through the walls of a highly porous filter stone molded in the shape of a tube closed at one end. The open lower end of this tube is mounted on a hollow pedestal allowing the filtered air to pass downward and out the exit. The filter tube is a recent development composed of aluminum oxide crystals mixed with a ceramic bond and molded into the tube shape.

A spare filter tube is furnished with each unit for replacement once in ten days or two weeks. The removed stone is cleaned in any oil solvent and dried for the next replacement. The life of the filter tube is very great as the cleansing process restores its full absorbent properties.



J & L STEEL FOR PARTS THAT MUST CARRY ON....

Hidden beneath the outer beauty of the motor car are many vital parts of motor and running gear which must serve dependably if the car is to give the buyer full satisfaction. It is significant that many Jones & Laughlin products, including Bessemer screw steel, forging steel, Jalcase steel, cold heading wire and spring wire, are widely used in the manufacture of these important working parts. The strength, workability and dependability of these J & L carbon steel products have assisted automobile manufacturers materially in improving the essential working parts of their cars and at the same time reducing prices to the public. Improved performance and economy go hand in hand when these J & L products are specified by the motor car manufacturer.

* * *

Other J & L products specified regularly by the automotive industry include: tubing, plates, shapes, strip, sheets and tin plate for manufacturing, and pipe, boiler tubes, nails, and fabricated structural material for plant construction and maintenance.

JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS
PITTSBURGH, PENNSYLVANIA

Impact and Static Tensile Properties of Bolts

AN investigation to determine the properties of bolts under impact tensile loading and also under static tensile loading has been made at the National Bureau of Standards. No less than 360 different specimens were tested, representing all possible combinations of five different materials (chromium-nickel steel, cold-rolled steel, monel metal, bronze and brass), four different bolt diameters (⅜, ½, ⅝, ¾ in.) and three different forms of screw threads (American National coarse, American National fine, and Dardelet). The bolts of different diameters were geometrically similar, the length between the head and the bearing surface of the nut being five times the diameter, the thread extending inward from the face of the nut one diameter.

In all cases the impact work for bolts with American National coarse threads was less than for bolts of the same size and material with the American National fine threads.

Specimens and methods used in this investigation, and the results obtained, are described in Research Paper 763 of the National Bureau of Standards, entitled "Impact and Static Tensile Properties of Bolts," by Herbert L. Whittemore, George W. Nussbaum, and Edgar O. Seaquist, of which copies can be obtained from the Superintendent of Documents, Washington, D. C., at 10 cents.

Fuel Injection Solves Power Problem on Radial Engine

IN the latest issue of his quarterly publication, M. Voisin, the French manufacturer, reports tests on his seven-cylinder radial, air-cooled sleeve-valve engine, of which drawings were shown in *Automotive Industries* of March 23. While the engine started all right, it soon developed big clouds of bluish smoke, which indicated that it was being over-oiled. This was cured by placing baffles inside the crankcase which caught the oil that was being thrown off the crank arms and directed it to the inlet of the scavenging pump.

Dynamometer tests were then started, but the results were disappointing, the engine barely developing 40 hp. at 2000 r.p.m., which was 80 hp. less than had been expected. The engine at that time was fitted with an inlet ring to which the carburetor connected at the bottom and from which the individual cylinders were fed through branches. A new inlet manifold was then cast, with six carburetor flanges, the object being to find the combination most favorable to high power and pick-up. Tests with this arrangement also proved unsatisfactory, for although two side outlet carburetors were fitted there was no increase in power, the engine was hard to start and did not show satisfactory pick-up. Distribution was exceedingly non-uniform and it was impossible to idle the engine.

To solve the distribution problem it was decided to fit the engine with mechanical injection equipment. In a Diesel engine, where such equipment is regularly used, it is permissible to inject varying quantities of fuel regardless of the air charge, but in a gasoline engine it is necessary that the air fuel ratio be maintained within rather close limits and this must be accomplished automatically. A form of governor was therefore rigged up which comprises a piston in a cylinder communicating with the inlet manifold, this piston being connected to the quantity control rod of the injection pump. Results obtained with this arrangement have been so satisfactory that it has been decided to build such injection equipment and try it out also on the stock cars of the firm. Development work on the radial engine is being continued along this line.